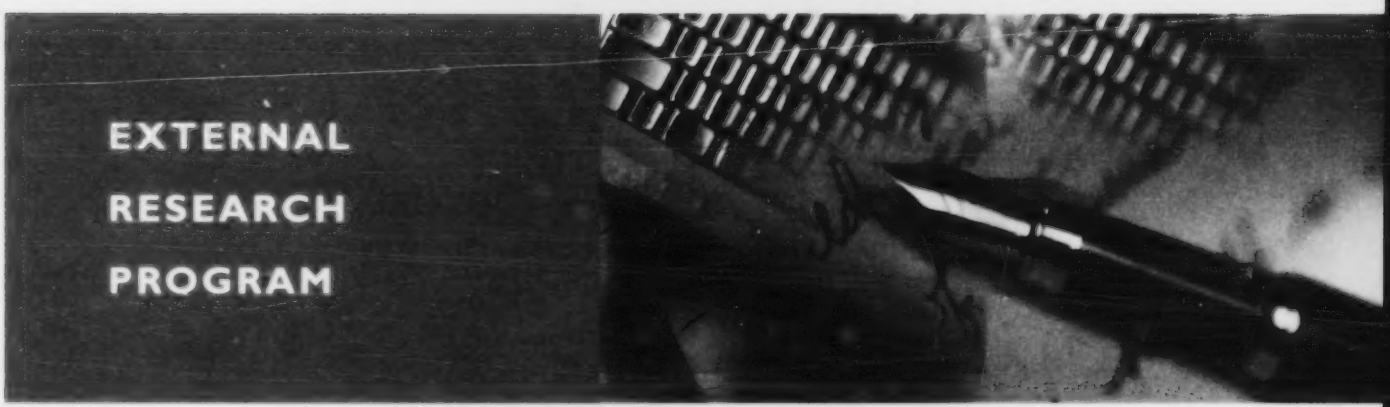
RESEARCH REPORT

HOUSING QUALITY AND CHILDREN'S SOCIOEMOTIONAL HEALTH



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HOUSING QUALITY AND CHILDREN'S SOCIOEMOTIONAL HEALTH

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by

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for
Optimal Environments, Inc.

One of the ways CMHC contributes to the improvement of housing and living conditions in Canada is by communicating the results of its research. Contact CMHC for a list of available information products on a variety of social, economic, environmental and technical housing-related topics.

This project was funded by Canada Mortgage and Housing Corporation (CMHC) under the terms of the External Research Program, but the views expressed are the personal views of the author and do not represent the official views of CMHC.

PURPOSE

This study was conducted in order to consider the possibility that the socioemotional health of Canadian children, measured as the number of behaviour problems they experience, is related to the physical quality and form of their housing, and their neighbourhood. Some strong associations were found, and the housing and the urban planning implications are discussed. An extension of the report considers six neighbourhood quality factors in relation to children's behaviour problems, their parents' emotional state, and parental satisfaction with the neighbourhood.

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EXECUTIVE SUMMARY

This study examined the possibility that children's emotional well-being, manifested in the frequency of mild behaviour problems, might be associated with their housing and neighbourhood quality. Recent studies of low-income children elsewhere have reported such connections. This study examined Canadian children from households with a wide range of incomes in a medium-sized francophone city (Québec) and a medium-sized anglophone city (Victoria).

Each of 95 children aged 9-12 recruited from public schools in Victoria and Québec City was independently assessed on a standard behaviour problem inventory by their school teacher and one of their parents. Trained assessors visited the children's residences and rated it and the immediate neighbourhood on 245 physical features (e.g., exposed wiring, clutter, damaged walls or floors). The child's parent was also interviewed concerning a further 65 physical aspects of the child's residence that would not be noticed in a one-time walk-through (e.g., the frequency with which the sink drains clogged or furnace problems occurred).

The psychometric properties of the behaviour-rating instrument was examined and found to be excellent. Several indices of housing quality were created from the 310 items in the housing checklist and interviews. The children, on average, were viewed by their parent and teacher as having a few mild behaviour problems, as would be expected for a group of typical non-delinquent children. The residences ranged from high quality and value to low quality and value. Thus, both the children and the residences varied across a wide but normal range of socioemotional health and housing quality.

The number of children's behaviour problems, as measured by the combined assessments of the parent and teacher, was found to be significantly related to two indices of housing quality: the general condition of the residence's interior and the general physical condition of the neighbourhood. Children in residences and neighbourhoods with more physical problems manifested more behaviour problems, and this did not vary with different levels of such factors as income and education. In an extension to the report (Appendix F), neighbourhood quality was the focus. Strong connections between some aspects of neighbourhood quality and children's behaviour problems, their parents' satisfaction, and their parents' emotional state were found.

Implications and suggestions that follow from these findings are offered, with the caveat that they are based on a study that could not draw causal conclusions, and should be replicated and expanded. Nevertheless, the study empirically demonstrates that poorer quality housing and neighbourhoods are clearly associated with more behaviour problems and therefore worse socioemotional health in Canadian children.

RÉSUMÉ

La présente étude examine la possibilité que le bien-être socio-affectif, tel qu'il se manifeste dans la fréquence de légers problèmes de comportement, pourraient être lié à la qualité de l'habitation et à celle du quartier. De récentes études portant sur les enfants de ménages à faible revenu aux États-Unis indiquent que de tels rapports existent. Cette recherche a étudié des enfants canadiens de famille ayant un large éventail de revenu dans une ville francophone de taille moyenne (Québec) et une ville anglophone de taille moyenne (Victoria).

Chacun des 95 enfants âgés de 9 à 12 ans provenant d'école publiques à Victoria et à Québec a été évalué par son en signant et un de ses parents en fonction d'un inventaire de problèmes de comportement normalisé. Des évaluateurs formés ont visité les habitations des enfants et leur ont donné une cote, de même qu'au quartier immédiat sur la foi de 245 caractéristiques physiques (c.-à-d. câblage apparent, encombrement, murs ou planchers endommagés). On a également interviewé un parent de l'enfant au sujet de 65 aspects physiques supplémentaires de l'habitation qui n'auraient pas été aperçus lors de la visite sommaire(c.-à-d. la fréquence de colmatage de la bonde de l'évier au bris du générateur de chaleur).

Les propriétés psychométriques de l'outil d'évaluation des comportements ont été examinées et se sont avérées excellentes. Plusieurs indices de qualité de l'habitation ont été créés à partir des 310 éléments de la liste de vérification de l'habitation et des entrevues. Généralement, le parent et l'enseignant ne notaient chez l'enfant que des légers problèmes de comportement, comme on est en droit de s'y attendre d'un group d'enfants. Les habitations allaient de grande qualité et valeur à faible qualité et valeur. Ainsi, tant les enfants que les habitations variaient sur une large gamme mais normale de bien être socio-affectif de qualité de l'habitation.

Le nombre de problème de comportement des enfants, tel que mesuré par évaluations intégrées des parents et des enseignants, s'est avéré lié de manière importante à deux indices de la qualité de l'habitation : l'état général de l'intérieur de l'habitation et la l'état physique général du quartier. Les enfants vivant dans des habitations et des quartiers de moins grande qualité manifestaient plus de problèmes de comportement, sans grande variation à égard à des facteurs tels que le revenu et l'éducation.

Les constatations et les suggestions découlant de ces résultats sont données ci-dessous avec la mise en garde qu'elles sont fondées sur une étude qui ne pouvait pas tirer de conclusions déterminantes et ne doit pas être reproduite ni élargie. Néanmoins, l'étude démontre empiriquement que les habitations et les quartiers de plus faible qualité engendrent plus de problèmes de comportement et, par conséquent un plus faible bien-être chez les enfants canadiens.

ABSTRACT

We examined whether the socioemotional health of 9-12 year-old children, assessed as frequency of behavior problems, is related to the physical quality of their residential environment. The children (n = 95) were from households with a wide range of incomes in two medium-sized Canadian cities. Each child was assessed on a standard behavior problem inventory by a teacher and a parent. Each child's residence and neighborhood were rated on 245 physical features based on an interviewer walk-through and a parent interview. More child behavior problems, as assessed by parents, occurred when the physical condition of the residence's interior and exterior, and the neighborhood, as assessed by both teachers and parents, was worse. These relations remained after controlling for household income, parent's education, parent's mental health status, child's gender, and time lived in the residence, and the relations were not significantly moderated by any of these factors. A significant curvilinear relation showed that the decline in socioemotional health slightly accelerates with worsening neighborhood physical conditions.

ABRÉGÉ

L'étude avait pour objectif de chercher à découvrir si le bien-être socio-affectif d'enfants âgés de 9 à 12 ans, évalué en fonction de la fréquence de problèmes de comportement, était lié à la qualité physique de leur milieu de vie résidentiel. Les enfants, au nombre de 95, provenaient de ménages affichant un large éventail de revenus dans deux villes canadiennes de taille moyenne. Chaque enfant a été évalué par un parent et par un enseignant suivant une liste normalisée de problèmes de comportements. L'habitation et le quartier de chacun des enfants ont été cotés en fonction de 245 caractéristiques physiques déterminées lors d'une visite des lieux et d'une entrevue avec les parents. Les enfants présentaient plus de problèmes de comportement, lorsque la qualité intérieure et extérieure de l'habitation, , selon l'évaluation des parents, et la qualité du quartier, selon l'évaluation tant des parents et que des enseignants, étaient moins élevées. Ces rapports sont demeurés sensiblement pareils, même après avoir été normalisés suivant le revenu du ménage, le niveau d'éducation des parents, l'état de santé mentale des parents, le sexe des enfants et la durée d'occupation dans un même logement. Un important rapport curvilinéaire montre qu'une légère détérioration du bien-être socio-effectif des enfants accompagne une baisse de la qualité physique des quartiers.

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INTRODUCTION

Overview

This study examined whether housing and neighbourhood quality and form are related to the socioemotional health of children, as reflected in the number of behaviour problems they manifest. Evidence from other countries suggests that poorer housing quality is related to poorer childhood mental health. These studies are both recent and well-conducted; they controlled for such potential confounds as household income, and they used standardized measures of mental health and housing quality.

As the authors of those studies point out, the scientific quality of much housing research has not been stellar. Such problems as lack of controls and non-standardized measures have meant that conclusions about housing and mental health are questionable.

This study used the best current research methods to investigate whether housing quality and housing form (e.g., single-family versus multi-unit housing) are related to the socioemotional health of children. The best research methods involve considerations that have been absent in some previous studies. First, an objective, tested method of measuring housing quality was employed. Second, a standard, well-tested measure of mental health (for non-clinical populations) was used.

Third, key moderator variables such as household income and indoor population density were considered in the analyses. Fourth, the possibility of curvilinear relations was investigated (most studies examine only linear possibilities). Fifth, the study examined the effect of length of residence. Some otherwise good recent studies have investigated the well-being of residents who recently moved to better housing, which confounds the effect of housing itself with the novelty and good feelings associated with moving to (any) new residence. Sixth, the study examined the role of the neighbourhood's physical quality in addition to that of the residence itself.

The best recent research–studies which support the hypothesis that better housing quality is associated with better mental health–was conducted among low-to-middle income families in rural U.S. settings. This raises the obvious question of whether the relation holds (a) in Canada (b) across a wider range of incomes, and (c) in urban settings, where almost 80 percent of Canadians live.

In sum, this study uses standardized measures of housing quality and mental health while considering the role of various potential moderating influences, including socioeconomic status, indoor population density, and neighbourhood quality to answer the basic question: is residential quality related to the socioemotional health of typical Canadian children?

The Research Question

This study examined whether and how housing quality is related to the behavioural well-being of children. Well-executed recent research conducted in the United States suggests that poor-quality housing adversely affects the mental health of adults (Evans, Wells, Chan, & Saltzman, 2000) as well as children (Evans, Saltzman, & Cooperman, 2001).

The possible implications for Canada are clear. One CMHC priority is to advance healthy housing; its current research proposal guidelines recognize that housing "has a wide range of direct and indirect costs and effects...on human health and well-being"

(p. 11). It is crucial to learn whether and how housing quality affects resident well-being, and it is equally important to approach the question by employing the best available research methods.

Non-optimal residential buildings have been accused of causing many unpleasant outcomes for their residents, such as fostering a variety of fears, housing dissatisfaction, stress, physical illness, behavioural problems, suicide, crime and fear of crime, poor social relations, more anti-social and less pro-social behaviour, and hindered child development (Gifford, in press).

However, it is not certain that these outcomes are related to housing quality per se. Perhaps they simply are salient because many people live so close together, and communicate their troubles more (social amplification of risk), or are somehow more visible to the media than, say, negative outcomes within single-family dwellings. Perhaps, on a per capita basis, there are no more negative outcomes in poorer-quality housing residents than in other housing. Or, perhaps, there are indeed more negative outcomes, but they are caused by factors other than housing form or quality.

How many of these claims are supported by quality research? As contemporary researchers (e.g., Evans, Wells, Chan, & Saltzman, 2000) claim, even the seemingly simple hypothesis that "housing quality affects mental health" has proved difficult to evaluate scientifically (p. 526). It may be that the outcomes of living poorer-quality buildings depend on various non-building factors, including characteristics and qualities of the residents themselves, or the surrounding physical context. These factors may *moderate* the relation between housing quality and the outcomes of living in it.

Potential Moderators

Any building might be associated with negative outcomes without being the cause of those outcomes. Several factors independent of the building itself may moderate residents' outcomes. Among these are residents' income level, high indoor population density, and neighbourhood quality. One might hypothesize that if residents are not poor and dwell in low indoor population density in a good neighbourhood they will escape most negative outcomes. Thus, residences may have varying effects on those who live in them, depending on such moderating factors.

Nonlinear Relations

Very typically, the assumption is made that if a relation exists between two variables, that relation will be linear, that is, as values of one increase (or decrease), values of the other will increase (or decrease). But two variables can be strongly related to one another in other ways.

Perhaps the most common is the U-shaped (or inverted-U-shaped) pattern. A classic example is the relation between physiological arousal and work performance. When a worker's arousal level is very low, performance is low. Performance initially rises with arousal, but it peaks at a moderate or moderately high level of arousal, and then begins to decline as the worker's arousal level becomes so high that work performance deteriorates.

Such patterns have been found before in environmental psychology (e.g., Churchman & Ginsberg, 1984) and other areas of social science. Such results serve to remind researchers not to overlook the important possibility that some outcomes are related to environmental variables in a curvilinear, rather than a linear, manner. Ignoring that possibility in an analysis could lead to the incorrect conclusion that no relation at all exists, because such a relation

may not appear in data analyses that search only for linear functions.

This study will look for curvilinear relations between environmental quality and children's socio-emotional health.

Problems with Housing Research

First, it is important to review how the effects of housing have been studied. The short answer is that many studies have serious shortcomings and only a few have been models of good research. Complaints about the adequacy of high-rise housing research have been made for the last 30 years, and continue today (e.g., Cappon, 1972; Evans, Wells, & Moch, 1998; van Vliet, 1983). Researchers are not entirely to blame for this. It is difficult and often impossible to carry out a study of housing that meets standard criteria for scientific hypothesis-testing, such as random assignment to housing, or experimental control over housing quality. Often, researchers are forced to use non-optimal research designs.

Housing in Relation to the Stress and Mental Health of Adults

Stress has many determinants. One, high indoor density, has been associated with many negative outcomes, including the strain of crowding (Gifford, 2002, chapter 8). Yet not every study reports more stress in higher-density residences. In an Israeli study (Churchman & Ginsberg, 1984), crowding did not linearly increase with density within the dwelling.

Another moderator of stress appears to be marital status, or gender within a marriage. A variety of outcomes for 560 families who lived in single-unit, duplex or triplex, and low- or high-rise apartments were examined (Edwards, Booth, & Edwards, 1982). Because only 11 percent of the sample lived in high rises, the researchers combined them with low-rise residents, which created an apartment category that included 28 percent of the entire sample. Stress levels in the three housing types were compared, and the analyses controlled for age, education, and occupational level. Residents of apartments reported more stress and more family conflict than residents of the other housing forms. Husbands' and wives' outcomes differed: husbands had a greater incidence of psychiatric impairment in apartments than in the other housing forms, but wives did not. Both sexes reported more marital discord in apartments than in other housing forms. Fathers had worse relationships with their children in apartments, including striking them more often.

Finally, building location may moderate the relation between building height and mental health (P. McCarthy, Byrne, Harrison, & Keithley, 1985). Distress was (non-significantly) greater in low-rise buildings than in houses, and greater in high rises than low rises. However, when the results were examined in terms of building location in better versus worse areas of town, distress was more related to area of town than to building form. McCarthy et al. took age, gender, health, and social class into consideration as possible moderators, and the results held up. Incidentally, another curvilinear relation was found in this study: distress itself was less in the under-25 and over-65 age groups than in the 25-64 age group.

Housing and Behavioural and Developmental Problems in Children

Are poorer-quality residences responsible for undesirable behaviour or hindered development in children? The evidence is very thin, but recent studies by Evans, Saltzman, and Cooperman (2001) certainly point in that direction. Low- to middle-income children in the United States were

found to have more behaviour problems when their housing quality was lower, even after controlling for income.

Another recent US study, this one of a very large sample, but of two-year olds, concluded that the link between poor neighbourhood conditions and children's mental health may be a true environmental effect (Caspi, Taylor, Moffitt, & Plomin, 2000).

This Study

The purpose of the present study is to determine whether links exist between Canadian children's socioemotional health, measured as the number of behaviour problems they are reported to have, and the physical quality of their home and neighbourhood.

The study is limited in terms of being able to draw causal conclusions because it cannot meet a cardinal tenet of experimental research, random assignment of children to better and worse residences and neighbourhoods, something that would be both practically difficult and unethical.

However, the study will use the best available methods to determine whether there is a significant association, linear or curvilinear, between environment and behaviour problems in these children.

If there is a significant relation, it will be subjected to extensive moderator analyses, to determine whether the relation is stronger for some groups or types of children or parents, etc. If a significant relation does not significantly change for many different conditions or types of children or parents, the likelihood rises (but never to certainty) that the relation between the variables (in this case, the physical quality of children's environments and their socioemotional health) is causal.

METHOD

Overview

95 children (45 in Québec City and 50 in Victoria; 61 girls and 34 boys) were selected on an availability basis after seeking the permission of their school principal and their parent. Attempts were made to obtain a broad range of socioeconomic status by approaching schools known to be in the upper and lower portions of the socioeconomic spectrum.

Participation rates were understandably low, for three reasons. First, permission had to be requested very indirectly, first through the children's school principals, and then through their teachers, who sent a note home to parents. Indirect requests are honored less often. Second, the study involved a behavioural assessment of the child, which can be threatening to some parents. Third, the study included a home visit that involved examining every part of the child's residence, which also can be threatening to some parents.

Nevertheless, the average annual family income was about average for the cities studied ($68,754, ranging from two households that claimed zero income, to $225,000), suggesting that participating households were at least typical in socioeconomic status, with a considerable range.

Each behaviour problem inventory (26 items) took a few minutes for the child's parent and teacher, who completed it independently. The residence visit took about 1.5 hours for the housing checklist and parent interview. Each teacher and parent signed a consent form that assured them their individual answers would not be shown to anyone except the researchers.

The interviewers were two women with experience in social science research. One was an advanced undergraduate major in psychology and the other is a trained architect now enrolled in a PhD program. Most parents (79 of 95) were mothers.

The Assessment Instruments

The appendices include some demographic variables (see Appendix A), a validated measure of adult emotional state (MHI-5, see Appendix B), the Children's Behaviour Inventory (CBI; see Appendix C), the housing checklist (see Appendix D), and the parent interview (see Appendix E). The elements of the major instruments are as follows.

Children's Behaviour Inventory

The behaviour problem inventory was the same used in the Evans, Saltzman, and Cooperman (2001) study (Appendix C). The CBI was chosen to keep the comparability of behaviour assessment between the US study and this one strong. The inventory is a well-developed one by Rutter (1970). In this study, each child was assessed by both a parent (CBI-P) and a teacher (CBI-T). The assessment items were the same in both cases.

The Housing Checklist

The housing checklist (Appendix D) was developed from that used in the Evans, Saltzman, and Cooperman (2001) study. Their version included 88 items. The checklist used in the current study used all their items, plus many more added after considering the nature of the residences to be studied. Typical items include such features, in each room of the residence, as odor, surface damage, exposed wiring, wall decorations, etc.

The Parent Interview

Some physical aspects of a residence are temporary or seasonal. For this reason, an interview also was conducted with each parent about intermittent possible events such as drain problems, range or furnace problems, or water seepage (Appendix E). This interview was also adapted from the Evans, Saltzman, and Cooperman (2001) study, but changed in some ways to reflect Canadian conditions.

Demographic Factors

Several demographic variables were also collected (Appendix A): the parent's age and gender, educational level, household income, marital status, the number of children, household population density (computed as number of persons per room), length of time in the residence, whether the family was blended, which city in which they resided, and their satisfaction with the residence and neighbourhood. These were collected to determine whether they might moderate the relation between housing quality and children's socioemotional health.

RESULTS

Psychometric Properties of the Children's Behaviour Inventory

The internal consistency reliability of the parent- and teacher-completed children's behaviour inventories were examined. The internal consistency (Cronbach's alpha) of the 26-item scale for the 95 parents was .78. In Québec, it was impossible to obtain teacher responses for 27 of the children. Alpha for the same scale for the 68 teacher-completed scales was .85. These are excellent values. Thus, behaviour scores were computed for each child from the summed 26 items of the parent and teacher inventories.

The Extent of Behaviour Problems

This study was intended to explore the environment- behaviour problem question for "typical" children. In a group of typical children, one does not expect a very large number of behaviour problems. However, even typical children often have a few problems. As may be seen from Table 1, this group of 95 children included some who had zero reported problems, but the average child had about 5 minor problems, according to their parents, and about 2.5 according to their teachers. The parents reported more problems for their children than did the teachers (presumably because they see their own children more and know them better). However, the parents and teachers did rank-order the children fairly similarly: the correlation between the independent assessments of the parents and teachers was significant ($r = .50$, $p < .01$), so the two groups tended to agree which children have more or fewer problems.

Table 1
Means, Standard Deviations, and Reliabilities for the Children's Behaviour Inventory (CBI)

	N	Min	Max	Mean	SD	Reliability
Parent Assessment (CBI-P)	95	26	45	31.33	4.23	.78
Teacher Assessment (CBI-T)	68	26	48	28.53	4.12	.85

Note. For the CBI, responses were "Does Not Apply" (scored 1), "Applies Somewhat" (scored 2), or "Certainly Applies" (scored 3). Thus, the lowest possible score was 26. N is the number of respondents, Min was the lowest observed score and Max was the highest. SD is the standard deviation, the amount above and below the mean that includes about two-thirds of all responses. Reliability was computed as Cronbach's alpha.

Quality of the Residences: The Checklist

In this study, the children lived in one of three residence forms. 57 lived in single-family dwellings, 21 lived in duplexes, and 14 lived in multiple-unit dwellings. In general, these residences, although they varied in value, ranged from reasonably good to excellent condition, and probably represent a

reasonably accurate cross-section of Canadian residences.

The housing checklist (Appendix B) included maintenance items for every room of the residence. The main items, which varied slightly to suit the function of each room, included exposed wiring, clutter, cleanliness, cracks, water damage, flooring, odors, and views. The number of items per room varied from 6 (basements) to 17 (kitchen) items per room, with most having 16 or 17 items. Altogether there were 214 checklist items for the inside of the residence, but not all were used for every residence; for example, the checklist included sections for 6 bedrooms.

Physical quality was computed as the number of problems per main room in the residence. Checklist items typically were scored 0 for no problems, 1 for a minor problem, 2 for larger problems, etc. Across all 95 residences (see Table 2), the number of problems per room ranged from zero to 1.40, with a mean of .41 problems per room. The variability of residential quality may also be seen in Figure 1, which shows these physical quality means for all 95 residences.

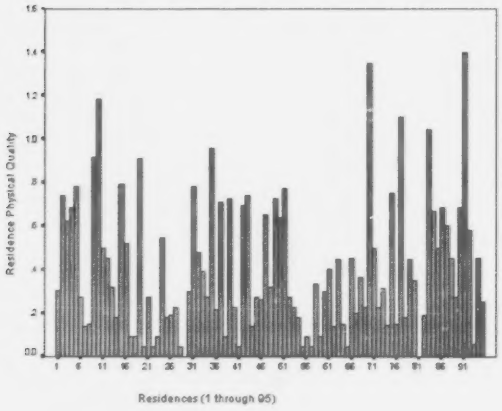

Figure 1. Variability in the Physical Quality of the Children's Residences

The checklist also included 14 items for the exterior of the residence, such the condition of its walls, outside stairs, and septic tank (if any). Physical quality on these items ranged from zero to 3.00, with a mean of .43.

Three checklist items recorded the building's number of floors, type of housing (single-family, apartment, etc.), and which floor the child's residence was on, in the case of a multi-storey building.

Finally, 6 items assessed the physical condition of the immediate neighbourhood: the size and traffic level of the residence's street, the condition of the sidewalk, litter on the block, and the general exterior condition of neighboring houses. Scores ranged from .41 problems (averaged across the 6 items) to 1.77 problems, with a mean of .89 problems. The variability of neighbourhood quality may be seen in Figure 2, which shows these quality means for all 95 residences.

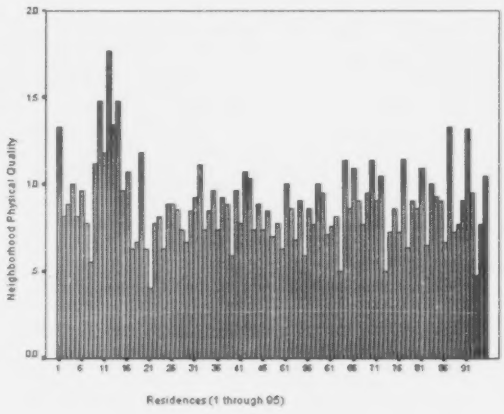

Figure 2. Variability in the Physical Quality of the Children's Neighbourhoods

Quality of the Residence and Neighbourhood: The Parent Interview

As noted earlier, one parent of each child was asked about temporary or seasonal events or aspects of the residence that might not be visible in a one-time walk-through.

These covered all the rooms, and included items such as problems with drains, ranges, furnaces, and pests. The interview also asked how many people lived in each room and the house, and crowding. Finally, parents were asked whether the child had a place for retreat and a designated play area. This part of the interview (Appendix C) had 59 items, although once again, not all items were used when a residence did not have a certain type of room.

The parents were then asked about the neighbourhood; whether it seemed to them to be safe, how far away were the nearest playground and elementary school, whether they interacted often with the neighbors. In all this part of the interview included 16 items.

Table 2
The Physical Quality of Selected Rooms, the Residence, and the Neighbourhood

	N	Min	Max	Mean	SD
Basement	85	0.00	1.75	.337	.397
Kitchen	95	0.00	1.00	.331	.163
Eating Area/Dining Room	90	0.00	1.00	.555	.429
Target Child's Bedroom	94	0.00	1.12	.224	.172
Bedroom 2	95	0.00	1.06	.350	.172
Bedroom 3	73	0.00	1.00	.299	.203
Bathroom 1	95	0.50	1.40	.424	.209
Bathroom 2	53	0.00	0.94	.311	.197
Living Room	95	0.00	1.50	.271	.254
Family Room	48	0.00	1.17	.471	.325
Entire Residence (Checklist)	95	0.21	1.02	.377	.165
General Residence Inside (Interview)	95	0.00	1.40	.411	.341
General Residence Outside (interview)	93	0.00	3.00	.434	.488
Neighbourhood	95	0.41	1.77	.887	.231

Note. Means are based only on residences that had each room. Typically, items were scored so that a 0 meant no problem, and 1, 2, etc. for more problems. The mean was computed across all items for a room, and across all main rooms for the residence. Thus, a low score represents a higher-quality space. See Table 1 for definitions of N, Min, Max, and SD.

Housing Form and Children's Socioemotional Health

The children's scores on the behaviour problem inventory were compared for the three housing forms, and although there were small absolute differences in the means for the different housing forms (see Table 3), these differences were not statistically significant ($p > .10$).

Thus, at least in this sample, housing form was not importantly related to children's socioemotional health. Perhaps it should be noted, in the light of some earlier studies (Gifford, in press), that no high-rise buildings were included in this study. Thus, in subsequent analyses, data for children from

the different housing forms were combined and analysed as a whole.

Housing Quality and Children's Socioemotional Health

Next, the relation between housing quality and children's behaviour problems was examined. These were done for parent and teacher behaviour assessments in relation to each room in the residence, the residence as a whole based on the checklist, the general residence as rated by the parent in the interview, the exterior of the residence, and the neighbourhood. Table 4 shows these results.

Perhaps the most important results are those relating to the overall physical quality of the residence and neighbourhood. Both are significantly related to the parents' assessment of the child's socioemotional health (rs = .39 and .28, respectively, both p < .01).

Table 3
Housing Form and Children's Socioemotional Health

	CBI-T	CBI-P
Single-family	28.00	30.79
n = 46/57	3.92	3.79
Duplex	30.57	31.14
n = 14/21	5.18	3.88
Multi-unit	27.50	33.43
n = 6/14	1.64	5.93

Note. CBI-T is the teacher's assessment; CBI-P is the parent's assessment. Means and standard deviations are reported. The ns of 46, 14, and 6 are for CBI-T and the ns of 57, 21, and 14 are for CBI-P.

Figures 3 and 4 are scatterplots for the 95 residences, depicting the relation between assessments of their child's socioemotional health (Figure 3), and the relation between neighbourhood quality (observed physical problems with the neighbourhood, such as how busy the street on which the residence is located is, how many lanes are in that street, the condition of the sidewalk, the general structural condition of neighbouring residential buildings, and the amount of litter (Figure 4).

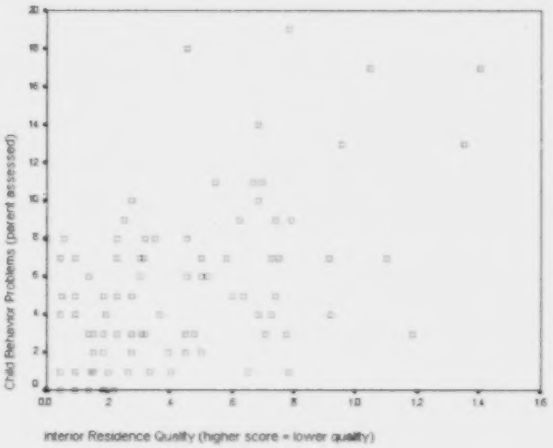

Figure 3. Children's Behaviour Problems and the Physical Quality of the Residence

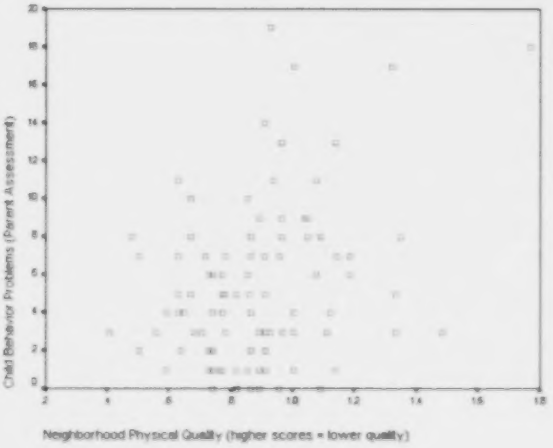

Figure 4. Children's Behaviour Problems and the Physical Quality of the Neighbourhood

At the level of the residence's interior, Table 4 shows that the children's socioemotional health is most strongly related to the condition of the living room, kitchen, child's bedroom, and main bathroom, presumably the four most important rooms of the child's residence. All those correlations are significant at the .01 level.

The same kind of analyses may be carried out in relation to measures of housing quality that cut across rooms, that is by examining important aspects of the residence as a whole.

To do this, every housing checklist and interview item that was significantly related to either the parent's or the teachers' assessments of the children's socioemotional health was identified (as Pearson correlation coefficients). These items were then factor analysed to find coherent groups of items, and scales consisting of three to eight items were constructed to represent each factor.

Five such scales were identified in this way: Poor Surfaces (holes in, or damage to, walls or ceilings, Heating Problems, Clutter and Cleanliness, Crowding (as judged by the parent), and Fear and Insecurity (fear of crime and vandalism in the neighbourhood). Each scale met usual psychometric standards (internal consistency reliabilities from .75 to 88), except the Fear and Insecurity scale (reliability only .56). These measures of overall housing quality were then correlated with the assessments of children's socioemotional health (see Table 5).

For a more specific perspective, Table 6 shows all the individual checklist and interview items that correlated with CBI-P at R=.30 or stronger. All these correlations are significant at the .01 level. For the most part, these are residence deficiencies that are difficult or expensive to remedy for the residents; they are "big" problems for the typical resident.

Table 4
Housing Quality and Children's Socioemotional Health

Environment	CBI-T	CBI-P
Basement	.14	.13
Kitchen	-.14	.28**
Dining Room/Area	.08	.07
Target Child's Room	.13	.28**
Bedroom 2	-.18	.22
Bedroom 3	-.05	-.02
Bathroom 1	.06	.28**
Bathroom 2	.15	.06
Living Room	-.00	.32**
Family Room	.10	.03
Entire Residence	.05	.39**
Neighbourhood	.24	.28**

Note. Parents' assessments are based on all 95 cases; teachers' assessments are based on 68 cases; it was impossible to obtain teacher ratings for 27 children in Québec. **p < .01.

Table 5
Housing Quality Scales in Relation to Children's Socioemotional Health

	CBI-P	CBI-T
Poor Surfaces	.23*	-.02
Heating Problems	.35**	-.02
Clutter and Cleanliness	.41**	.06
Crowding	.44**	.07
Fear and Insecurity	.37**	.27*
Overall Quality	.55**	.12

Note. Pearson correlations. **p < .01 *p < .05
Each scale is composed of 3 to 8 related items. The Overall Quality scale is the sum of the other five scales.

Children's Socioemotional Health in Relation to Environmental Quality

Next, the children's socioemotional health, as reflected in their behaviour problems, was predicted from the housing and neighbourhood quality scales. The purpose of this analysis was not to imply a causal relation, which of course would only be defensible had children been randomly assigned to different housing qualities. Instead, the purpose was to estimate how much of the variation in the children's behaviour problems could be related to aspects of the children's housing and neighbourhood environment.

Table 6
Individual Housing Items Strongly Related to Children's Socioemotional Health

Item	CBI-Parents
Bathroom Door Not Closable	.52
Noise Bothersome (all sources)	45
Noise from Trains	.44
Oven Problems	.43
Child's Bedroom Unclean	.42
Refrigerator Problems	.41
Residence "Cramped"	.40
Hot Water Problems	.40
Ant or Spider Problems	.39
Living Room Heat Problems	.39
Residence "Crowded"	.39
Fear of Break-ins, Vandalism	.37
People "Get Under Foot"	.36
Living Room Unclean	.34
Heat Problems in Child's Room	.31
Fearful Outdoors During the Day	.31
More Floors in the Building	.31
Problems with Bathroom Walls	.30
Fearful Outdoors During Night	.30

Item	CBI-Teachers
Bathroom Door Not Closable	.672
Bedroom Serves as Passageway	.365
Clutter in the Study	.340
Exposed Wiring in the Study	.346
Busy Street	.414

Note. The figures are effect sizes expressed as Pearson correlation coefficients; all are statistically significant at the .01 level.

The parents' assessment (CBI-P) was predicted from the housing scales that showed a significant zero-order correlation with it, that is, the quality of the kitchen, child's bedroom, main bathroom, and living room (presumably the four most important rooms in any residence for a child). This analysis

revealed that these aspects of housing quality have a multiple
correlation with child behaviour problems of $\underline{R}$ = .38, and therefore account for 14.1 percent of the variance in the behaviour problems of the children.

This may not seem like a large association, but it must be recognized that children's behaviour problems have many determinants, and it is likely that none of them alone are particularly potent causes. Given this, the magnitude of the relation between the quality of the child's residential environment and the children's socioemotional health as measured by the CBI-P is not trivial. It may be approximately compared, to use an easily envisioned example, to the magnitude of the average difference in height between girls aged 14 and 18; that is, a clearly noticeable difference if one were to look at two long rows of girls, one row of each age (Cohen, 1988, p. 26-27).

In fact, the present effect is slightly larger than that difference, perhaps equal to the average difference in height of 13- versus 18-year- old girls. In the realm of social science, it is reasonable to label this a medium- to-large effect (Cohen, 1988). In sum, children's socioemotional problems are related to the physical quality of their environments in a not-inconsequential way.

This is not all. When neighbourhood quality is added to the prediction equation, the multiple correlation rises to $\underline{R}$ = .44, which is equivalent to 19.5 percent of the variance in children's problems. Thus, interior housing quality plus neighbourhood quality have, by Cohen's (1988) highly respected standards, nearly a "strong" effect size.

Another way to examine the same question is to look at the relation between the summed scales (see Table 5: Entire Residence) and children's problems. That relation is $\underline{r}$ = .39, which is about the same magnitude of effect.

Possible Moderators

Moderators are variables or factors that alter the relation between two variables of interest. In this case, the two prime variables of interest are housing quality and children's socioemotional health. For example, hypothetically, if household income moderated the relation between these variables, there would be a different relation between housing quality and behaviour problems for children from families with higher versus lower incomes.

This study considered ten possible moderators: household population density, child's gender, family income, number of children living at home, length of residence, city (Victoria versus Québec City), married versus single parents, whether the family was a blended one or not, parent's education, parent's age. Household population density was computed as the total number of residents in the household divided by the total number of rooms in the residence.

Standard methods of evaluating the potency of these moderators were used (Cohen & Cohen, 1983). The simple outcome of these analyses was that none of the moderators were significant. That is to say, the relation between children's behaviour problems and the two housing quality variables (general condition of the house interior and physical quality of the neighbourhood) were no less true for any level or variation of the 10 potential moderators.

This suggests that the moderate-to - strong relation between housing quality and children's socioemotional health is very stable (robust) across many social, economic, and demographic conditions. Although causality still cannot be attributed to the connection, the odds are higher that there is a causal link between housing quality and children's socioemotional health.

Possible Curvilinear Relations

Conceivably, children's behaviour problems could be related to housing or neighbourhood quality in a curvilinear fashion. For example, there could be more problems when the child's residence is in poor condition, fewer when the residence is in average condition, and more numerous again when the residence is in excellent condition (perhaps because the parents spend all their time improving and cleaning the house, and neglecting their children, or because wealthy children who live in very good residences are overindulged).

To consider this possibility, curve-fitting analyses were conducted, specifically to search for significant quadratic patterns, that is, U-shaped or inverted-U-shaped relations, as described in the example above.

The housing quality variables examined included all those in Table 4, that is, each main room of the residence, plus the more general measures of general house interior and neighbourhood quality.

One of these housing quality factors showed a significant curvilinear relation with children's behaviour problems. As may be seen in Figure 5, as the physical quality of the neighbourhood decreased, the frequency of behaviour problems increased, but not in a strict linear fashion. Rather, it appears that problems are relatively constant over the better half of the range of neighbourhood quality, but as neighbourhood quality falls below average, there is a rapid rise in behaviour problems.

The measure of neighbourhood quality included such things as the state of repair of nearby buildings, how busy and wide the street was, amount of litter, and the condition of the sidewalk. None of these alone might be an adequate measure, but collectively they probably distinguish fairly well a good neighbourhood from a problematic one.

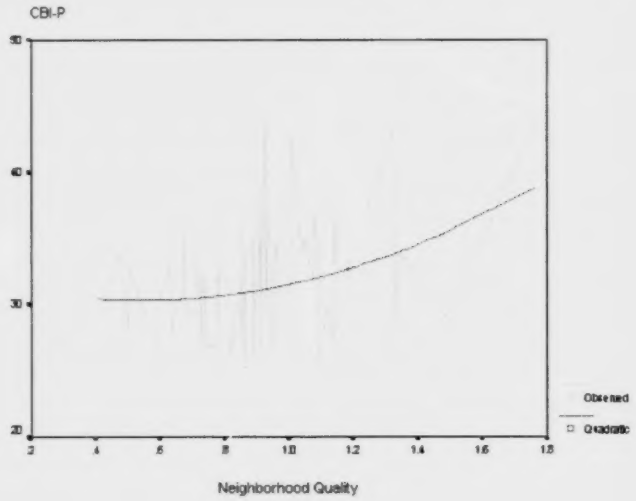

Figure 5. Curvilinear Relation Between Behaviour Problems and Neighbourhood Quality

That children's socioemotional health not only worsens with declining neighbourhood quality, but that the decline begins to accelerate as neighbourhood quality worsens would seem to be an important, even ominous, sign that remedies are called for.

DISCUSSION

Overview

In this sample of 95 typical anglophone and francophone Canadian children aged 9-12, significant associations were found between the physical quality of their housing and their socioemotional health. A similar relation was found for the physical quality of their neighbourhood. In every case, the direction of the association was that poorer socioemotional health in children was correlated with worse residential and neighbourhood physical quality.

To investigate whether these associations vary with factors such as income, education, and child's gender, etc., we examined 10 of these possible moderators of the relation between housing quality and socioemotional health relation, and none were significant. This suggests that these relations are stable across all these 10 potential moderating factors.

One can also examine whether the relation is linear (the usual assumption) or curvilinear (a reasonable but often-not-analyzed possibility). We found that children's behaviour problems, as an indicator of their socioemotional health, do not increase much from wealthier to middle-level neighbourhoods, but they begin to increase more dramatically as neighbourhood quality changes from middle to lower levels of quality.

Limitations

Among the more apparent limitations of this study, only two cities were sampled, and these were medium-sized cities. In addition, both are low-industry, civil-service-oriented cities. The study's results cannot safely be generalized to large cities or small towns, or to more heavily industrialized places. On the other hand, cities that are dominated by both of Canada's official languages were included, which widens the generalizability of its findings.

Second, as noted earlier, causality cannot be claimed for the relation between housing and neighbourhood conditions and children's socioemotional health. Against that, the Caspi et al. (2000) study took some steps toward being able to claim causal connections, and this study did eliminate 10 possible moderators of the relation, which does add to the possibility that poorer quality housing and neighbourhoods do cause lower levels of children's socioemotional health.

Third, this study focused on children without serious behaviour problems; in general, these children had relatively few problems. Thus, conclusions should not be generalized to children with more severe behaviour problems. However, the study does allow cautious generalization to most typical Canadian children in the 9-12 age group, those who do not suffer from very low levels of daily functioning.

Some Design Implications

With these limitations in mind, some rather clear implications for housing planning are apparent. In general, if there is a causal relation between physical housing and neighbourhood quality and children's socioemotional health, then improvements in housing are warranted, where they are necessary. Table 6 depicts some particular areas of residences that might be remedied. Given Figure 5, which shows that the effect begins to accelerate at lower levels of neighbourhood quality, the suggestion would be that special efforts are required to ameliorate the lower levels of neighbourhood physical quality.

Needed Research

Most studies of children's behaviour problems focus on social factors. This study suggests that such problems are related to physical decay or deterioration in children's housing and neighbourhoods. In this suggestion, it echoes the work of Caspi et al. (2002), whose genetic-based research design and large sample add credence to the possibility that children's physical settings have their own unique (but unfortunate) effect on mental health when their housing is substandard. Multiplied across the large number of children in Canada who live in sub-standard housing, this possibility deserves much more attention.

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APPENDIX A: *A Focus on the Neighbourhood: Neighbourhood-Oriented Results, General Commentary, Design Recommendations, and Suggestions for an Improved Assessment Instrument*

Overview

This study's main purpose was to examine children's socioemotional health in relation to the quality of their residence; the neighbourhood was not the primary focus. However, a number of items pertaining to the neighbourhood were included in this study, some in interviews with the parents and other features observed by the interviewer. These 24 items are listed among the full list of items in the Appendices D and E to the main report. They are item numbers 226, 237, 240 to 245 and 294 to 309. 23 items will be examined, because one item (307) was split into two (bus service, 310, and bus proximity, 311), but two others, 295 and 302, had almost no variance, and therefore were not examined. These 23 items, collectively, are this study's measure of neighbourhood quality.

The main outcome measure in this study is children's behaviour problems. However, one item on the parents' demographic page asked about their satisfaction with the neighbourhood, and another 5-item scale assessed the level of parents' emotional distress. Thus, the outcome measures are parents' satisfaction with the neighbourhood, children's behaviour problems, and parents' emotional state.

The existence of these 23 neighbourhood quality items and these outcome measures allows for the examination of the relations between the two. Therefore, in this Appendix we offer:

(a) a summary of the impact of neighbourhood quality on children's and parents' socioemotional health, and parents' satisfaction, based on the results of this study,

(b) general commentary about the results, based on our experience and the results and conclusions of previous studies in the literature,

(c) suggestions for practitioners who might be designing new or redeveloped neighbourhoods, and

d) suggestions toward an improved neighbourhood quality assessment instrument.

Neighbourhood Quality Categories in Relation to the Outcome Measures

Twenty-two of the items may be logically grouped into 6 major categories: Proximities, Maintenance, Crime and Security, Traffic, Pollution, and Community Ties. The 23rd item (Q237) indexed the type of residence (single-family, attached house, or multiple-unit dwelling).

In order to develop a "big picture" view of the relations between neighbourhood quality and socioemotional health, we examined correlations between these categories and parent and teacher assessments of children's behaviour problems (CBQ-P and CBQ-T, see the 26-items Children's Behaviour Problem Inventory, appendix C), the single neighbourhood satisfaction item (item 3 on the Household and Parent/Guardian Information questionnaire, appendix A), and parents' emotional distress (a validated 5-item instrument, appendix B). Each of these outcome measures (children's behaviour problems, parent satisfaction, and

parents' distress) is a useful part of the larger construct of socioemotional health.

To do so, scales were created to represent each of the six categories. The items in each category were (see the full assessment inventories, Residence Checklist, appendix D, and Parent Interview, appendix E, for details of each numbered item):

- *Proximities*: 226, 237, 240, 294, 299, 311
- *Maintenance*: 243, 244, 245, 310
- *Crime and Security*: 296, 298, 300, 301, 303, 304, 309
- *Traffic*: 241, 242
- *Pollution (noise and air)*: 297, 306
- *Community Ties*: 305, 308

The most important categories related to the first outcome measure, children's behaviour problems (CBQ-P) are: pollution, mostly based on noise ($r = .27$, $p = .01$) and traffic ($r = .21$, $p < .05$). As assessed by their teachers (CBQ-T), the most important neighbourhood quality dimension relating to children's behaviour problems is traffic ($r = .38$, $p = .001$).

The most important categories associated with the second measure of socioemotional health, parents' emotional distress are pollution, mostly based on noise ($r = .43$, $p < .001$), and traffic ($r = .32$, $p < .01$).

The most important categories related to parents' neighbourhood satisfaction are, in order: traffic ($r = .47$, $p < .001$), pollution, mostly based on noise ($r = .41$, $p = .001$), and crime and security ($r = .36$, $p < .001$).

Five Cautionary Notes

These results are very provocative, because some of the relations between neighbourhood quality elements and the all of the outcome measures are very strong. However, caution must be exercised in the interpretation of these results.

First, as noted earlier, the study was aimed at assessing the quality of the child's residence, and included only a small number of neighbourhood measures. Thus, the measurement of neighbourhood quality could have been improved if neighbourhoods had been the primary focus of the study.

Second, the primary purpose of this study was to include residences of variable physical quality, and it did so, but only in two cities, Québec and Victoria, both of which are generally desirable places to live. However, it should be noted that within each city, families of relatively high and low socioeconomic status were included, who lived in relatively expensive and less-expensive neighbourhoods.

Third, of the six neighbourhood quality categories, three (community ties, pollution, and traffic) were assessed with only two items each (again, this was because neighbourhood quality was not the main focus of the study). Scales with only two items are not, in general, good measurement practice. This could lead to false-negative results for these neighbourhood analyses, that is, missing a relation that actually exists. A future study that centrally focuses on neighbourhoods could, however, improve the measurement of neighbourhood quality.

Fourth, correlation does not imply causation. Factors that were *not* investigated in this study may cause both socioemotional health and neighbourhood quality, so that these two can be correlated without either causing the other.

Fifth, socioemotional health is, we presume, related to many factors besides the quality of a person's neighbourhood, including (within the scope of this study), the quality of the residence's interior (especially problems with heating and appliances), and social factors (such as relations with family and friends).

Interim Conclusions

This study measured the outcomes of neighbourhood quality in unusual, but important, ways: the rate of behaviour problems in children, and parents' emotional

well-being. It also did so in a more traditional way by assessing parents' satisfaction.

The results at the "big picture" level suggest that traffic, pollution (mainly noise), and fear of crime are importantly related to neighbourhood quality, but proximities, maintenance, and community ties are not. The latter is surprising, given the importance of these three neighbourhood quality elements in the urban planning literature. As noted earlier, however, these elements could, in a study mainly devoted to the measurement of neighbourhood quality, be measured more adequately. Despite all these cautions, these results provide a glimpse of the power of neighbourhood quality as one key factor in socioemotional health.

Next, the results of the study are described at a more detailed level for each of the six neighbourhood quality categories.

A More Detailed Examination of Neighbourhood Quality in Relation to Socioemotional Health and Satisfaction

In this section, each of the six categories will be discussed in terms of this study's specific results, general commentary based on the research literature, design recommendations for practitioners, and suggestions for an improved neighbourhood assessment instrument.

Proximities

Proximities in the neighbourhood refers to the closeness of neighbors, schools, parks, playgrounds, transport, and other amenities.

A. Distance to Neighbors

In this Study:

Question 240 (distance to the closest neighbor) had no impact on children's socioemotional health, or their parents' distress. This may be because, in this sample, the question did elicit much variation among the residences: all but one of the residences in the study were 16 meters or less from the nearest neighbor, and 8 meters was the smallest unit in the question response format. The question should have been phrased to include smaller gradations of distance.

However, there was a small relation between inter-residence distance and parent satisfaction ($r = .23$, $p < .05$), such that satisfaction was greater when neighboring residences were farther away.

Because of the problem with Q 240, we considered a proxy measure of inter-residence distance, type of residence (Q 237: detached single family; duplex or row house; multiple dwelling). Type of residence was not related to children's socio-emotional health or to parents' distress, which suggests that these residence types are acceptable for these outcomes.

However, living in a single-family houses was related to greater satisfaction with the neighbourhood, as might be expected. This might be understood from the standpoint of privacy (Altman, 1975). Single-family houses usually allow more privacy to their inhabitants than duplexes, row houses, or multiple-unit dwellings.

Perhaps surprisingly, however, multiple-unit dwelling residents were also more satisfied with their neighbourhood than residents of row houses or duplexes. This may have occurred mainly in Quebec City, where multiple-unit dwellings are common downtown, in mixed residential-commercial-working neighbourhoods which are popular with residents.

General Commentary:

Recent research suggests that proximity to neighbors is not a problem as long as privacy of the residents is respected (e.g., Mitrany, 2003). This privacy may be visual, acoustic or even olfactory. As long as residents are able to control the amount of information that they send to or receive from

their surroundings, actual distance to neighbors is less important.

High density (and thus greater proximity to neighbors) has often been related to problems and dissatisfaction, but many residents are also satisfied, even in very high density, and the available amount of space *inside* the dwelling has an important ameliorating effect on inhabitants' feelings of residential crowding (Moch, Bordas, & Hermand, 1996).

High residential densities, when accompanied by good sound insulation, consideration of visual and odor privacy, and adequate indoor space, can be advantageous. It can encourage closer community ties in a neighbourhood. Large distances between neighbours were considered desirable during the 20th-century wave of suburban development, because they seemed to be a way to escape from often unpopular and unclean downtown areas, and provided a sense of having a private estate. However, living farther from neighbors creates low-density neighbourhoods and, indirectly, sprawl, which is associated with health problems, such as obesity or asthma for children (e.g., Jackson & Kochtitzky, 2001) and hypertension and other health problems for parents (e.g., Ewing, Schmid, Killingsworth, Zlot, & Raudenbush, 2003).

Design Recommendations:

Paying attention to neighbourhood privacy (Altman, 1975) during the planning process is very important. Privacy should not be considered the same as isolation; rather, privacy must be considered as the optimum balance between isolation, when that is desired, and social interaction, when that is desired.

Careful design can create optimal levels of privacy for each building type (single family houses, attached houses, condominiums, etc.) and for different community densities, including mixed neighbourhoods with stores and working places. Some authors (e.g., Cooper Marcus, 1986) propose useful specific recommendations for urban planners who are interested in designing for privacy. Excellent sound insulation, and windows and doors arranged so they do not provide easy access to adjacent dwellings, are important design elements.

Suggestions for a New Assessment Instrument:

In addition to a better measure of physical proximity to neighbors, privacy measures should be included. These measures should reflect the subjective feelings of residents about visual, acoustic and olfactory privacy. The objective measures should reflect the actual distance between neighbors as well as information on problematic designs with poor acoustics or too much visual exposure to neighbors. Thus, we recommend adding a privacy category in a new assessment instrument.

B. Distance to Schools, Playgrounds and Parks

In this Study:

The main amenities used by children in a neighbourhood are their school (for those children who attend the local school) and the nearest playground or park.

Unfortunately, distance to playground had almost no variability because the smallest response unit was too large ("less than one mile").

Victoria has more parks closer to residences than Quebec City, t (93) = 3.3, p = .001, but the distance from the residences to these amenities was not correlated with children's emotional health as assessed by their parents, or any of the other outcome measures.

Because most residences in this study were quite close to schools and parks, there was little variability in this concept as measured in this study, which restricts the

chance of finding a relation with the outcome measures.

However, among the 5 parent-feeling items, the proximity of parks was related to less nervousness in parents ($r = .29$, $p < .01$).

However, although the proximity of a park or school was not important in this study, the existence of a place for children to play outdoors where parents can watch from the house (Q226) was important. When they had such a view, parents' feelings about their residences was more positive ($r = -.29$, $p < .01$) and parental socio-emotional health was also better ($r = -.23$, $p < .05$). Residents of single-family dwellings reported that they were able to watch their children playing outside more often ($r = .37$, $p < .01$).

General Commentary:

The research literature indicates that having access to a playground is important for children's development (Wortham & Wortham, 1989), and contact with natural elements such as soil, water, or vegetation are very attractive and stimulating for children (Moore, 1997). Recent reviews of the literature focus on the urgent necessity to design cities that allow children to play outside (e.g., Jutras, 2003). Often, adults do not realize the importance of natural elements in children developmental process (Davies, 1996).

Another benefit of closer schools is related to increased independent mobility in children (Herlin-Norinder, 2000). Proximate schools also encourage more physical activity during the trip to school and after school, especially for boys (Cooper, Page, Foster, & Qahwaji, 2003). Optimal cognitive, physical, social development in children is facilitated by social interaction among the children as they walk to school or a park; being transported to school by adults deprives children of some important elements of physical and psychological development (Armstrong, 1993; Kegerreis, 1993). Therefore, not surprisingly, having schools, playgrounds, parks or even an informal place to play close to the residence is important for children's well-being.

Recently, parents have become more fearful about their children's safety in public areas. This tends to prevent parents from allowing children outside, especially if the neighbourhood has realistic dangers (Wilcox, Quisenberry, & Jones, 2003).

However, the fear of crime often exceeds the reality of crime, and proximate schools and parks usually allow parents to feel less nervous and more secure in allowing their children to go outside (Prezza, Pilloni, Morabito, Sersante, Alparone & Giuliani, 2001). Parks and playgrounds facilitate spontaneous games among groups of children in the neighbourhood. Thus, in general, schools and parks that are nearer to the residence create a favorable context for children's development and are important factors in families residential choices (e.g., Moore, 1997).

Design Recommendations:

We recommend that neighbourhood design supports children's independent mobility by offering, as much as possible, walkable distances to the main amenities used by children. Thus, parks, playgrounds or open spaces usable by children should be integrated into neighbourhoods, even if they are small. Parents should have a view from their residence that allow them to watch their children playing outside. In high-density neighbourhoods, buildings with protected courtyards could be a good solution to support children's developing autonomy (Prezza, Pilloni, Morabito, Sersante, Alparone & Giuliani, 2001). Elementary schools should also support children's independent mobility by being situated relatively close to residences.

Suggestions for a New Assessment Instrument:

Residents in many neighbourhoods often do not walk enough because the distance to amenities such as parks is too great. Thus, we propose that a new instrument includes items that reflect the presence or absence of walkable distances to these amenities.

In a revised version of the assessment instrument, the distance choices in the items need to be refined (reduced) to be closer to the reality of units of walkable distance. Because some people think in terms of time and others in distance, the items we propose phrase the items in terms of both time and distance (e.g., 1 kilometer/15 minutes). Furthermore, because actual and perceived distances are not always the same, we propose assessing residents' perceptions of the proximity to amenities. We also recommend asking whether the proximity of school and parks was part of the parents' consideration in their choice of a residence.

C. Distance to Public Transport

In this Study:

The distances between residences and bus stops were greater in Victoria than in Quebec ($r = .32$, $p < .01$). However, the perceived closeness of bus stops was not related to the socioemotional health of the children. Perhaps this is because at 9-12 years old, in primary school, most children usually do not use public transportation. Some ride on a school bus, but that is different than public transportation. Thus, public transportation usually is not an important dimension of neighbourhood quality in young children's well-being.

It is surprising, however, that the closeness of bus stops was unrelated to parents' satisfaction with the neighbourhood. However, proximity to bus stops was related to perception of crime in the neighbourhood ($r = .25$, $p < .02$), probably because buses are usually connected with busy streets, and busy streets are usually associated with crime.

General Commentary:

Other studies do report that public transportation service is an indicator of neighbourhood satisfaction (e.g., Fornara, Bonaiuto, Aiello, & Bonnes, 2000). Of course, their study was done in Europe, where more people use public transportation than in North America. As the use of public transport grows in North America, its proximity should become more important for neighbourhood satisfaction.

Assuming that public transport does not have much effect on 9-12 year olds because they do not use it much, it will become more important when they become teens and begin to attend secondary school. At that point, the proximity of bus stops becomes a support for their autonomous mobility and a factor in their integration into the neighbourhood and the larger community and city.

Design Recommendations:

Although good public transport is not directly related to 9-12 year-old children's well-being, it is, or soon will be, an important element in their accessibility to the rest of the city. One would hope, too, that more North American adults will begin to use public transport. Thus, designers should try to support proximate public transportation in the design process. Of course, this goal is also compatible with environmental and physical health reasons for having good public transport.

Suggestions for a New Assessment Instrument:

Despite the lack of importance of public transport for the younger children in this study, it is important to consider it for older children and adults. Thus, in addition to asking about the distance to bus stops, we recommend asking about the frequency of use of public transportation by children (and

adults). Just one public transport distance item was used in this study. In a study focusing on neighbourhood quality, more items are needed, such as perceived as well as objective distances to bus stops, so that designers will know what "close enough" means to residents. That buses are closely tied to busy streets will need to be considered if their separate effects on outcome measures is to be clarified.

D. Distance to Other Amenities

In this Study:
Proximity to amenities, except for schools, parks and playgrounds, was not among the neighbourhood attributes in this study. Again, this was because this study focused on residences rather than neighbourhoods.

General Commentary:
Amenities such as a nearby grocery store or bakery in a neighbourhood are appreciated by children (Heurlin-Norinder, 2000), and they also support a richer daily life for the parents and other adults in the neighbourhood. The proximity of such amenities is related to neighbourhood satisfaction (e.g., Fried, 1984). In general, we consider that food-related amenities are the most important addition to a neighbourhood, because they might be used almost daily if they are close enough.

However, other amenities are also appreciated (e.g., library, community center, recreational facilities, churches, temples, or mosques, other commercial services such as a pharmacy, hardware store, and bank) but are less crucial because their use is more weekly-based than daily-based. Thus these week-based amenities should also be designed into local neighbourhoods.

Design Recommendations:
The first priority for the practitioner is to ensure the proximate inclusion of food-and grocery-related amenities in the neighbourhood. These support the parents' life as well as children's autonomous mobility (the children can go to the store for themselves or for their parents). The other sorts of services and recreational amenities are important, too, but they are more to play a role as connectors between neighbourhoods, at the city scale, than at the residential neighbourhood scale.

Suggestions for a New Assessment Instrument:
Neighbourhood quality depends first on daily needs, so perceived closeness and actual distances for food or other daily needs should be added. Children's autonomous mobility related to these amenities should be assessed. Items related to weekly needs should also be part of the instrument, but with the recognition that they probably are of slightly less importance.

Maintenance and Services

In this Study:
The maintenance category includes repairs to neighbourhood elements and public services. No maintenance or operation items (condition of the sidewalk, residences' external condition, litter, and public transport service) were related to children's socioemotional health, to parental distress, or even to parental satisfaction with the neighbourhood. Perhaps this occurred because in this sample, although some residences were in relatively poor neighbourhoods, none suffered from very poor maintenance.

Neighbourhood maintenance is partly due to the efforts of the municipality (e.g., sidewalk condition) and partly due to the efforts of the inhabitants or owners (e.g., litter, lawns, condition of the residence), who are not always the same individuals.

In this study, litter outside (primarily under the control of residents) was significantly related to the quality of the residential interiors. The relation of outside

litter to household clutter was $r = .23$, $p < .05$, with surface condition in the house (walls and floors) it was $r = .26$, $p < .02$, and with the general house condition inside it was $r = .23$, $p < .05$). All this is also related to household income (all three $ps > .25$, all $rs < .02$). Thus, poor maintenance outside (and inside) the houses clearly are indicators of less wealthy neighbourhoods.

General Commentary:

The study showed that outdoor neighbourhood maintenance is not directly related to socio-emotional health. However, other studies show that neighbourhood maintenance is related to feelings of security and satisfaction in the neighbourhood (Raun, 2002; Taylor, Shumaker, & Gottfredson, 1985).

Some neighbourhoods are certainly less well maintained and have worse services than those in this study. Because there is evidence from other studies that maintenance is related to satisfaction (Taylor, 1982), neighbourhood maintenance and operations should be considered in future studies. It is a reasonable possibility, although we do not have the data to support this assertion, that well-maintained exteriors may encourage residents to keep their interiors in better condition, which in turn could affect the socioemotional health of both children and their parents.

Design Recommendations:

The initial design of a community would not include maintenance concerns per se, because a new neighbourhood is expected to be fresh and clean. However, the design or redevelopment of neighbourhoods should include design provisions that facilitate future maintenance: quality materials, street designs that facilitate cleaning, including litter and recycling receptacles, and defensible space design that limits vandalism.

In addition, providing spaces that residents can appropriate is also a way to encourage care and maintenance of the neighbourhood. Parents would then feel more secure about their neighbourhood as a place for children. Healthy neighbourhoods seem to be better maintained and cared for by inhabitants and the cities, but special attention should be paid by designers when they consider less-wealthy neighbourhoods.

Suggestions for a New Assessment Instrument:

The instrument should continue to include maintenance and operation items because other studies suggest that they are important, at least for satisfaction, if not socioemotional health. Perhaps more maintenance items need to be included for a full assessment of this dimension of neighbourhood quality (cf. Fornara, Bonaiuto, Aiello, & Bonnes, 2000), to measure street condition, transport service, street cleaning, and maintenance of dwelling exteriors and yards by residents. Care shown by inhabitants toward their neighbourhood also should be considered.

Crime and Security

In this Study:

Beliefs about crime and security, specifically that the residence is not safe from burglars ($r = .37$, $p < .001$) and not feeling secure outside at night ($r = .30$, $p < .01$), were strongly correlated with more behaviour problems in children, as assessed by their parents. Both were also correlated with parents' fears of allowing their child outside during the day ($r = .24$, $p < .02$ for fear of breakins and $r = .35$, $p < .001$ for insecurity outside at night).

The parents' dissatisfaction with the neighbourhood was strongly associated with feeling insecure walking in the neighbourhood at night ($r = .46$, $p < .001$) and that the residence is not safe from breakins ($r = .48$, $p < .001$). As well, the parents' own emotional health was strongly related to the

same two beliefs about crime (both $r_s = .44$, $p < .01$). Single parents were more fearful about breakins ($r = .25$, $p < .05$), less secure outside at night ($r = .27$, $p < .05$), and believed their neighbourhood had more crime ($r = .33$, $p < .01$).

How were crime and security fears related to physical aspects of the neighbourhood? The fear of breakins and feeling insecure outside at night were strongly related to traffic (number of lanes $r = .40$ and $r = .42$, both $ps < .001$; busy streets $r = .24$ and .21, both $ps < .05$). Both fears were also related to greater perceived noise ($r = .27$ and .38, both $ps < .001$). The belief that the neighbourhood has more crime was greater for multiple-unit dwellings ($r = .26$, $p < .02$), when the distance between neighbors was less ($r = .31$, $p < .01$), and when sidewalks were in worse condition ($r = .25$, $p < .02$).

General Commentary:

It is not easy to feel good about a neighbourhood if every time a person goes outside, she or he fears getting mugged or raped. Many studies (e.g., Nasar & Jones, 1997) demonstrate that feeling secure in the neighbourhood is one of the most important dimensions of neighbourhood satisfaction. Unfortunately, many adults are afraid of walking in their own neighbourhoods, even to go to the closest store (e.g., Cook, 1988; Thompson 1998). Fear of crime discourages older residents from leaving their homes to take the bus (Patterson, 1985), generally limits residents' routine activities (Keane, 1998), and even affects their mental health (White, Kasl, Zahner, & Will, 1987).

Parents' fears are not limited to their own safety or welfare, of course. Parents also fear possible traffic accidents involving their children (Garling, Svensson-Garling, & Valsiner, 1984) which could explain why they are more worried when they live close to a busy street. Parents are also concerned with criminality and hostility in the neighbourhood (Heurlin-Norinder, 2000). Parental stress and anxiety about the social environment is related to decline in children's independent mobility (Blakely, 1994).

In general, it is interesting that fear of crime does not heavily depend on actual crime rate. It may be inflated by flashy media portrayals. In a study of Hong Kong versus Toronto, for example, fear of crime was more closely associated with population density than with actual crime rates (Gifford & Peacock, 1979). Neighbourhoods that residents *believe* to be dangerous are not always the neighbourhoods with the statistically highest rates of crime (Kirk, 1988). This is an unresolved issue, however, because others have concluded that density is more associated with actual crime than with fear of crime (Taylor, 1982).

It must be said, however, that crime does not have universally negative effects on neighbourhood satisfaction. For example, a European study found that burglary victims did *not* develop strong negative feelings about their neighbourhood (Van der Wurff & Stringer, 1989). However, an American study reported the more expected outcome that residents who believe their neighbourhood to be safer are more satisfied with it (Baba & Austin, 1989). Neighbourhood physical decay may, by association, usually evoke fear of crime, but one study reported that this was true only for moderate-income residents, not for all residents (Taylor, 1982).

In general, the relations between fear of crime, actual crime rates, neighbourhood decay, and neighbourhood satisfaction remain complex. In terms of the physical aspects of neighbourhoods, lighting designed to facilitate surveillance of public areas reduces fear, even when crime rates may not have been reduced (Tien, O'Donnell, Barnett, & Mirchandani, 1979). Well-maintained yards and, perhaps surprisingly, more trees also make feel safer (Kuo, Bacaicoa, & Sullivan, 1998). Visibility is important: places where a potential attacker might hide and dark spots are the worst (Nasar & Jones, 1997). In this

study, living in multiple-unit dwellings was related to increased perceived crime (probably because less wealthy inhabitants and single parents more often live in multiple-unit dwellings). Some studies show that type of building in a neighbourhood is related to crime rate, but mainly for high-rise buildings (over 13 floors), which have more crimes in their public areas than low-rise buildings (e.g., Newman, 1996). Of course, such findings will be modified by other factors, such as the social context in which the buildings are situated.

Design Recommendations:

Preventing crime in neighbourhoods by any means is important, but planners and designers can help by attending to defensible space and crime prevention through environmental design (CPTED) principles (cf. Gifford, 2002). Crime prevention is important in this particular context because children who grow up in violent communities are less socially competent and have less behavioural control (Barbarin & Wet, 1997).

Defensible space and CPTED theories have evolved over many years (Newman, 1972, 1996), and offer many suggestions for designing more secure neighbourhoods. However, these concepts and their possibilities still are not well-enough understood by designers (Tijerino, 1999).

The main principles for designing secure neighbourhood spaces include: (a) designs in which all spaces are perceived as being under *someone's* territorial influence (i. e., avoid "no-man's land"), (b) facilitate personalization of houses and yards, (c) create designs that allow easy surveillance of public spaces by residents through careful placement of windows, (d) avoid too-large public spaces because they are difficult to control, and (e) avoid isolation of developments and buildings that create ghettos.

However, as shown in these results, perceived security also seems to be strongly related to elements of urbanization. When living on busy streets, amidst the noise and traffic, parents fear for their children and themselves. The designer's goal should be to control carefully the design of residences on major streets, and to provide affordable housing, as much as possible, on smaller connected streets. These streets should have trees, good lighting, small buildings and offer the possibility of appropriation by the residents and maintenance of green areas either by residents or the city. The basic amenities should be nearby, so as to reduce the need for vehicles and to encourage walking, which in turn encourages familiarization with the environment, good health and social interaction among pedestrian-neighbours.

A reduction in children's mobility when parents felt insecure was found in this study. As a design solution, the results suggest that a place for children to play outdoors where parents can easily watch from the house would be an important factor in reducing parents' worries and in supporting children's autonomous mobility.

Suggestions for a New Assessment Instrument:

A new assessment instrument should include items specifically designed to measure defensible space concepts, lighting, maintenance of green areas, and the prevalence of trees.

Traffic

In this Study:

Traffic (the "busy street" item, Q241) was significantly correlated with children's socio-emotional health as rated by their parents ($r = .23$, $p < .05$). Both busy streets and the number of lanes in the street were even more strongly correlated with children's mental health as rated by their teachers ($r =$

.41, $p < .01$ and $r = .26$, $p < .05$), to parents' satisfaction with the neighbourhood ($r = .29$, $p < .01$ and $r = .45$, $p < .01$), and with parents' emotional distress ($r = .26$, $p < .05$ and $r = .28$, $p < .01$).

Children were less likely to be allowed to go outside alone when they lived on busy streets ($r = .21$, $p < .05$). Given that busy streets are also typical of less well-kept neighbourhoods (damaged houses in the block is correlated with busy streets, $r = .24$, $p < .05$), it is reasonable to assume that residential settings on busy streets are less supportive for children's development in terms of playing outdoor games, exploration, and autonomous mobility.

General Commentary:

Exploration of places near home allows children access to a large range of stimulation and developmental opportunities (Abu-Ghazzeh, 1998). The possibility of frequenting streets and near-residence environments by children supports the development of their personal identity, self–esteem and stress-coping skills (Raymund, 1995).

Busy streets do not create a favorable context for children and, although this was not found in the present study, others report that parents (understandably) set more limits on their children's independent mobility when streets are busy environments (Bjoklid, 2000). Thus, enclosing children for their safety incurs the cost of reducing benefits to them from independent exploration of the neighbourhood.

This study shows that children's socioemotional health (CBQ-T) is strongly related to parents' emotional well-being ($r = .50$, $p < .001$). Thus, the negative effects of the traffic on children's well-being probably is reinforced by the negative effects of traffic on the parents, and vice versa.

Design Recommendations:

Ideally, there would be no residences on very busy streets, at least child-oriented residences. Of course, this is not always possible. Thus, the planner's task is to reduce the negative impact of living with children on busy streets.

In general, street-calming devices such as speed bumps help to reduce speed and accidents (Depeau, 2000). Access control to neighbourhood streets can divert local traffic from through streets; this is another defensible space design element (Cose, 1994). Second, busy streets could be treated more as urban boulevards, with mixed residential buildings, retail stores and offices (residences above the stores or offices). The design of these boulevards should include good sidewalks with trees, benches and other amenities that allow children to have access to the nearby environment, and ease the fears of parents. The more closely such building can be placed together avoiding large empty spaces between "boxes" the better. Both sprawl and "no-man's lands" are reduced.

Third, the negative impact of living on a busy street might be compensated by close, easily accessible schools and parks, although more research is necessary to determine whether this helps or not.

However, designers must recognize that busy streets and heavy traffic are not only a problem because of their proximity to residences. They are also problematic when they act as barriers to salutogenic amenities such as parks, playgrounds, schools, or daily amenities by existing between a residence and the amenity. Thus, safe accessibility solutions in the neighbourhood should be considered as a main outcome by thinking to the pedestrians as main users of the streets.

Suggestions for a New Assessment Instrument:

Access to schools, parks and daily needs such as grocery stores in the neighbourhood should be carefully considered so as to reduce risks for pedestrians and allow

children to walk and play outside. Thus, in terms of neighbourhood assessment, we recommend adding items about safe accessibility for children and their parents to the main services in the neighbourhood. We also recommend assessing the possibility of the nearby environment for supporting autonomous exploration outdoors. These items include assessing the presence of sidewalks or safe pedestrian pathways, and the walkability of the main commercial streets, the time spent outside by the children, and parents' feelings of security with traffic threats.

Pollution (Noise, Air, Light and Chemical)

In this Study:

About two-thirds (67.4 percent) of the parents complained that noise from one source or another bothered them at least once each week. Noise pollution was correlated with children's behaviour problems as assessed by parents ($r = .28$, $p < .01$) and strongly related to parental emotional stress ($r = .46$, $p < .01$) and satisfaction with the neighbourhood ($r = .42$, $p < .01$).

Parents who lived in multiple-unit buildings ($r = .25$, $p < .02$), on busier streets ($r = .26$, $p < .05$), and in areas with more damaged residences ($r = .24$, $p < .05$) complained more, which is not very surprising, considering the proximity of neighbors, the heavy traffic and the poorer quality of residences. Younger parents also complained more than older parents about noise ($r = .38$, $p < .001$). Parents who complained more about noise were more worried about breakins ($r = .27$, $p < .01$), felt less secure going out at night ($r = .38$, $p < .001$), and locked their doors more often ($r = .21$, $p < .05$).

Respondents in this sample did not report much disturbance from air pollution; the two cities studied are not very industrial, and have relatively little air pollution. No correlation was found with the reported socio-emotional health of the children, although it was related to parents' satisfaction with the neighbourhood ($r = .22$, $p < .05$) and marginally related to their emotional distress ($r = .20$, $p = .055$). Younger parents reported more annoyance from air pollution ($r = .30$, $p < .01$) , as did those who lived on wider streets ($r = .23$, $p < .05$). This was associated with feeling less secure outside at night ($r = .20$, $p < .05$).

Residents were not asked about light or chemical pollution in this study.

General Commentary:

Noise is an urban stressor (Moser, 1992) and is known to have negative effects on the well-being of both children (Cohen, Evans, Krantz, Stokols, & Kelly, 1981) and adults (Weinstein,1982). Many studies emphasize the importance of acoustic comfort and well-being in urban space (e.g., Shulte-Fotkamps, 2000; Moch, 1995). Thus, it is essential for planners to consider noise abatement in neighbourhoods.

Noise problems go beyond absolute levels of objective (decibel) measures. Residents develop expectations of noise levels depending on the type of neighbourhood. For example, Michelson (1977) found that Toronto suburbanites were more upset about noise than Toronto urbanites, even though objective noise levels were higher in the downtown areas. Suburbanities *expect* more quiet.

Noise annoyance depends partly on how the resident views the noise-maker's reason for being noisy (e.g., as necessary or frivolous) and the degree of control over the noise felt by the listener (does he or she feel comfortable asking the noise-maker to reduce the noise?). Worse noises are those that are less common, seem avoidable, and occur at night (Levy-Leboyer, 1991). Such findings make the estimation of annoyance levels

caused by particular sounds more predictable (Green & Fidell, 1991).

The same level of sound also can be more annoying to people who associate it with other negative events. For example, aircraft noise annoyance is based in part on fears that planes may crash (Moran, Gunn, & Loeb, 1981).

It might be argued that residents can get used to noise. Some people who live near airports have sound-insulated their homes to protect themselves against exposure. This appears to reduce annoyance in the short term, but it does not in the long term (Fidell & Silvati, 1991). Other research confirms that residents do *not* adapt to noise. The same residents were interviewed 4 months and 16 months after a major new highway opened in their community (Weinstein, 1982). The new highway raised sound levels 16 to 20 decibels above that in similar neighbourhoods with no highway. The residents' annoyance with the increased sound did not decrease in the 12-month interval between surveys, and residents became more pessimistic about their ability to adapt.

Noise also has a depressant effect on helpfulness, which can affect neighbourhood social relations. When faced with noise, people tend to try to escape the noise, rather than to help someone in need. They walk faster and gaze straight ahead more (Korte & Grant, 1980). Noise in the streets even influences how residents think about others. When individuals were asked to form impressions of others under low- and high-noise conditions, their interpersonal judgments were more extreme. Noise, perhaps because it acts as a general arousal agent, influences people to reach stronger conclusions about others than they might make under normal conditions (Siegel & Steele, 1980).

Air pollution is, of course, known to affect health and to shorten lives, and therefore excessive levels of it are a problem for the health of children and their parents. Pollution from vehicles represents the most common air pollution problem in most neighbourhoods (Girling, 2000), and it is the cause of bronchitis and asthma for children (Kunzli, 2000).

Laboratory studies suggest that bad odors negatively affect mood and attraction to others. For example, students exposed to a bad-smelling pollutant judged peers (shown in photographs) lower on a scale of well-being (Rotton, 1983) and a moderately bad odor facilitated aggression (Rotton, Frey, Barry, Milligan, & Fitzpatrick, 1979). This led environmental psychologists to search for links between air pollution and social pathology in community settings. In two studies, higher levels of photochemical oxidants in the air were correlated with more domestic disputes and more instances of psychiatric disturbance (Rotton & Frey, 1984; 1985).

Light pollution is increasingly recognized as a nuisance (Gifford, 2000). For example, over-lighting of streets, stadiums, offices, public monuments or even front yards is more common in recent years, but causes great concern to those who are subjected to it. So far, however, most attention related to light pollution has been concerned with the negative effects on astronomical observation than to the negative effects on quality of life. Because the problem is becoming more widely recognized, it should be carefully considered by planners.

It goes almost without saying that residents of chemically polluted communities report more illness and less satisfaction with community life, but at least this has been empirically demonstrated (Adeola, 2000). Love Canal and other infamous projects built on chemically contaminated sites create endless worry, as well as health problems in some residents.

Design Recommendations:

It is patently obvious that, in general, neighbourhoods should be planned to be pollution-free. Pollution is, by definition, undesirable. However, the literature surveyed above informs planners more about exactly *why* pollution must be controlled; it gives them scientific reasons for designing it out of neighbourhoods. There is a need for this because there are economic forces that essentially argue that pollution is acceptable when some economic benefit may result from allowing pollution in a neighbourhood.

Furthermore, one person's good lighting is another person's light pollution; one person's fun is another person's noise pollution; one person's warmth from a wood fire is another person's source of respiratory problems, and one person's solution to garden weeds is another person's illness from herbicides. Thus, to a certain extent, the problem with pollution is not always some external source, but other neighbourhood residents. Of course, pollution also enters a neighbourhood from passing vehicles (cars, buses, and aircraft), and industry both light (restaurants) and heavy (factories). Our point is that pollution comes from within neighbourhoods as well as from outside them; vigilance is necessary at both levels.

Reducing noise annoyance is important in the design process. Some solutions are possible at the architectural level (e.g., double glazed windows, building shape and orientation) to reduce noise levels, but that does not mitigate the negative effects of noise while residents are outdoors.

Neighbourhood design should focus on noise control, largely in terms of traffic control. Reducing traffic noise by reorganizing the traffic itself can reduce both noise and air pollution. "Creating compact, mixed-use communities could reduce the number of short car trips, and as a result, reduce air pollution. Integrating bicycle networks into new and existing neighbourhoods multiplies the benefits of compact development" (Girling, 2000, abstract).

Designers should also consider the treatment of smoke and odors, especially in mixed neighbourhoods with restaurants. Finally, because light pollution is a growing problem, we suggest that designers take it in account by more carefully choosing the location and type of lighting in neighbourhoods.

Suggestions for a New Assessment Instrument:

The instrument already contains items related to noise and air pollution. However, we suggest adding light and chemical pollution items to the questionnaire to assess their possible impact on children and their parents.

Community Ties

In this Study:

The sample had a very good distribution of parents' relations with their neighbors. Some were very close to them, and some were not. Some spent much time with them and some not. However, neither of the questions concerning the parents' ties to the neighbors were related to children's socio-emotional health, to parents' satisfaction, or to distress.

Thus, based on the results of this study, it is not possible to draw clear conclusions about the relations between socio-emotional health and community ties. However, one design characteristic of the neighbourhood seems to support community ties. Time spent with neighbours was related to the parents' ability to watch their children playing outside the house. ($r=.215$, $p<.05$). It may well be that the same views allow parents to see their neighbors, which gives them the chance to go outside and interact with them.

General Commentary:

Whether or not social ties are important in a neighbourhood is unresolved. Long ago, Fried and Gleicher (1961) showed that neighbourhood satisfaction is not necessarily related to better physical quality, although more recent studies suggest that it can be (Fried, 1982).

In an ideal world, they would be, but over the course of the 20th century, social ties seem to be more often to family (who do not live in the neighbourhood) or to co-workers, particularly as more and more women have joined the workforce. One recent study does suggest that the mother's sense of community in a neighbourhood is related to children's independent autonomy, because social trust in the neighbourhood makes them feel more secure for their children (Prezza, 2001)

Even if it did not appear in this study, there is evidence that strong neighbourhood ties are one way to improve neighbourhood satisfaction (Fornara, Bonaiuto, Aiello, & Bonnes, 2002). Althought certain physical variables such as benches, crossroads, subway entrances, or sunny places (Whyte, 1980) support social interactions in public plazas, the problem of residential neighbourhoods is slightly different. It is mainly based on the psychosocial characteristics of the inhabitants. Thus, some neighbourhoods support better social ties than others. Rivlin (1982) distinguishes several kinds of neighbourhoods, as follows: The *integral neighbourhood* has much face-to-face interaction, much cohesiveness from neighbourhood support of local interest and values, and much participation in organizations outside the neighbourhood. The *parochial neighbourhood* is like the integral neighbourhood except that it has fewer ties to outside organizations; it is inward facing and may even discourage participation in the wider community. The *anomic neighbourhood* has little face-to-face contact, little identification, and few ties to the outside world. It is our sense that more and more neighbourhoods have been anomic in the last several decades

In the middle of the 20th century, Whyte (1956) wrote that social ties were very predictable merely from the placement of the residence on the block. In particular, he believed that residents of corner houses would almost inevitably be isolated. In an ingenious study, he showed that social interaction patterns in a neighbourhood were so tied to the locations of the houses that even after residents moved, the social patterns remained the same, that is, that they depended on house location, not the people who lived in them.

While disparaging this strict determinism, Michelson (1977) agrees that house arrangements on a block will facilite social interaction *if* the residents are socioeconomically homogeneous. Other studies, beginning in the early 1950s (e.g., Festinger, Schachter, & Back, 1950) but not contradicted by later research, clearly show that social interaction is facilitated by proximity. However, this proximity is not strict physical distance, but *functional* distance. That is, such design features as stairs and mailboxes that draw people near to one another in their daily life act much more strongly than the physical distance, say, between back-to-back apartments, which technically are very cllose to each other.

Design Recommendations:

Whether or not social ties are important in 21st-century neighbourhoods, there is no good reason *not* to encourage those ties, unless those encouragements succeed in infringing on residents' privacy needs. Rivlin's (1982) notion of an integral neighbourhood seems desirable. The planner's goal should be to facilitate the development of integral or at least parochial neighbourhoods. For Rivlin, organized events for the neighbourhood, a social leader, an

intentional community, or even a church in the neighbourhood are important ways to support community ties. We think this can be achieved in general by higher densities, dwellings placed closer to the street, narrower streets, and an organic street pattern that discourages through traffic As shown by the results of this study, these neighbourhoods should also offer good visual connection with places for children to play outside.

If privacy problems are carefully controlled, higher-density designs, such as townhouses, duplex-triplex or small (3-4 storey) multiple-units residences would be recommended.

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APPENDIX B: *Household and Parent/Guardian Information*

Your answers to these questions will help us to place all the information we receive in context. Everyone lives in different circumstances, and in order to understand the situation of you and your child in relation to the situation of other families in the study, we ask the following questions. If there is a question you do not wish to answer, you do not have to answer. However, we hope you will choose to answer all the questions so that we may draw the most accurate conclusions about how housing is related to the well-being of children. Thank you!

Your name_____ Date_____

1. How long have you lived in this residence?_____
2. How many children live here?_____
3. Considering everything, how do you feel about this residence? (Circle one, please)

Extremely Dissatisfied	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Extremely satisfied

4. Considering everything, how do you feel about this neighbourhood? (Circle one, please)

Extremely Dissatisfied	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	Extremely satisfied

5 I am the child's mother____ father____ other (what?)_____

6 This is a single-parent____ or two-parent____ household.

7 Is it a blended family? _____

8 My year of birth was 19___

9 In terms of education, the highest level of education that I have completed is:

_____Grade school
_____High school
_____Community College
_____University First Degree (e.g., Baccalaureate)
_____University Advanced Degree (e.g., Masters)

7. The total household income, before taxes, in 2000 was _____

Go on to the 5-item questionnaire on the next page, please...

APPENDIX C: The Parent's Feelings Scale

"How much of the time, during the last month, have you..."

	All of the time	Most of the time	Some of the time	Occasionally	None of the time
1. ...been a very nervous person?	_____	_____	_____	_____	_____
2. ...felt calm and peaceful?	_____	_____	_____	_____	_____
3. ...felt downhearted and blue?	_____	_____	_____	_____	_____
4. ...been a happy person?	_____	_____	_____	_____	_____
5. ...felt so down in the dumps that nothing could cheer you up?	_____	_____	_____	_____	_____

Parent of (child's first name)_____

School_____Teacher's first name_____

APPENDIX D: *The Children's Behaviour Problem Inventory*

Below are a series of descriptions of behaviour often shown by children. After each statement are three columns: 'Does Not Apply', 'Applies Somewhat', and Certainly Applies'. If your child definitely shows the behaviour described by the statement, mark 'Certainly Applies '. If your child shows the behaviour described by the statement but to a lesser degree or less often, mark 'Applies Somewhat '. If, as far as you are aware, your child does not show the behaviour place a mark 'Does Not Apply'. Please put ONE mark for EACH statement. Thank you!

Your assessments will be never be seen by anyone except the researcher and his assistant, so your most candid assessment is appreciated.

	Does Not Apply	Applies Somewhat	Certainly Applies
1. Very restless. Often running about or jumping up and down. Hardly ever still.			
2. Truant from school			
3. Squirmy, fidgety child			
4. Often destroys own or others' belongings			
5. Frequently fights with other children			
6. Not much liked by other children			
7. Often worried, worries about many thing			
8. Tends to do things on his own-rather solitary			
9. Irritable. Is quick to 'fly off the handle'			
10. Often appears miserable, unhappy, tearful or distressed			
11. Has twitches, mannerisms or tics of the face or body			
12. Frequently sucks thumb or finger			
13. Frequently bites nails or fingers			
14. Tends to be absent from school for trivial reasons			
15. Is often disobedient			
16. Has poor concentration or short attention span			
17. Tends to be fearful or afraid of new things or new situations			
18. Fussy or over-particular			
19. Often tells lies			
20. Has stolen things on one or more occasions			
21. Has wet or soiled self at school this year			
22. Often complains of pains or aches			
23. Has had tears on arrival at school or has refused to come into the building this year			
24. Has a stutter or stammer			
25. Has other speech difficulty			
26. Bullies other children			

Your name_____ Child's first name_____ School_____

APPENDIX E: *The Residence Checklist*

Be sure to record subject ID, date, and address in your record book, and to record the subject ID in columns ABC of both computer sheets.

If a question does not apply or this residence does not have a certain kind of room, or the listed item does not exist in that particular room, then just leave it blank.

BASEMENT (only if this family has access to it; otherwise leave 1-7 blank – don't include service area, furnace, washer, dryer…)

1 What is it used for ? if a family room, rate as a living room; if an office, rate as a study; if a play space, check one:
A = finished family room only B= finished office only
C = finished family room and office (and\or more or other rooms)
D = unfinished E = finished family room + office + at least one other room

2 Odors
A= none B = slight C = bad

3 In what condition are the basement stairs ?
A= good B =functionally good, but cracked or discolored
C = potentially dangerous e.g., severe structural damage
(e.g. No backs to single stairs, nails stick out; stairs move when used)

4 In what condition is the handrail?
A= good B = wobbly but useable C = unuseable D = none

5 Is there trash in the basement?
A = none B =2 bags or cans or less C = more than 2 bags or cans

6 Are there cracks in the foundation?
A = none B =less than 1 ft crack C =more than 1 ft crack

KITCHEN

7 Odors
A= none B = slight C = bad

8 Sink: is there water leaking from the faucet?
A = no B = slight dripping C = very quick drip or flow

9 How much clutter is in the room?
A = little B = some clutter C = chaos

10 How clean is the room ?

A = clean (can be rated clean if stained but washed)
B = satisfactory (e.g., dirt in corners of floor; dirt inside burners; one appliance dirty, but rest of the room clean)
C = dirty or moldy

11 Garbage container
A = closed B = open in closed space C = open

12 Where are toxic substances kept ? (e.g., Strong cleaning agents, pesticides)
A = upper cabinet & locked B=upper cabinet or locked
C = easily accessible leave blank if no toxins in room

13 Ventilation fan
A = yes B = no

14 Is there any exposed structural wiring ?
A = no B = yes

15 Are there extension cords exposed (excluding those around the perimeter of the room) ?
A = no B = yes

16 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

17 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no
blank if no exterior door

18 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

19 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

20 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

21 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

22 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

23 What is the view from the room? (stand where most natural view can be seen; sky is natural)

A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

EATING AREA

rate whole room here if it is a separate room (e.g., Dining room), but if it is part of another room, include it in that room's rating

24 Is it a separate room?
A=yes B=no

25 How much clutter is in the room?
A=little b=some clutter c=chaos

26 How clean is the room?
A = clean (can be rated clean if stained but washed)
B = satisfactory (e.g., dirt in corners of floor; but rest of the room clean)
C = dirty or moldy

27 Is there any exposed structural wiring ?
A=no B=yes

28 Are there extension cords exposed (excluding those around the perimeter of the room)?
A = no B = yes

29 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

30 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no
leave blank if no exterior door

31 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

32 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

33 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

34 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

35 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

36 What is the view from the room? (stand where most natural view can be seen; sky is natural)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

BATHROOM #1

37 Odors
A= none B = slight C = bad

38 In what physical condition is the toilet ?
A=fine B=some cracks less than 1 inch
C=more than a 1" crack or pieces missing

39 Bathtub – shower: there is
A = both B = shower only C = bathtub only D = none

40 Windows
A=blinds in good shape / frosted glass
B=blinds in ok shape (broken slats or holes)
C=no blinds or frosted glass

41 Is the door closable ?
A = yes B = not tight / gap C = no

42 How much clutter is in the room?
A = little B = some clutter C = chaos

43 How clean is the room ?
A = clean (can be rated clean if stained but washed)
B = satisfactory (e.g., dirt in corners of floor or bath, but rest of the room clean)
C = dirty or moldy

44 Is there any exposed structural wiring ?
A = no B = yes

45 Are there extension cords exposed (excluding those around the perimeter of the room)?
A = no B = yes

46 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

47 If there is an exterior door, does it lock ?

A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

48 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

49 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good
B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

50 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

51 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

52 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

53 What is the view from the room? (stand where most natural view can be seen; sky is natural)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

BATHROOM #2
(go to 71 if only one bathroom; if more than 2 bathrooms, ignore the rest)

54 Odors
A= none B = slight C = bad

55 In what physical condition is the toilet ?
A=fine B=some cracks less than 1 inch
C=more than a 1" crack or pieces missing

56 Bathtub – shower: there is
A = both B = shower only C = bathtub only D = none

57 Windows
A=blinds in good shape / frosted glass
B=blinds in ok shape (broken slats or holes)
C=no blinds or frosted glass

58 Is the door closable ?
A = yes B = not tight / gap C = no

59 How much clutter is in the room?
A = little B = some clutter C = chaos

60 How clean is the room ?
A = clean (can be rated clean if stained but washed)
B = satisfactory (e.g., dirt in corners of floor; or bath, but rest of the room clean)
C = dirty or moldy

61 Is there any exposed structural wiring ?
A = no B = yes

62 Are there extension cords exposed (excluding those around the perimeter of the room) ?
A = no B = yes

63 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

64 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

65 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

66 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good
B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

67 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

68 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

69 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

70 What is the view from the room? (stand where most natural view can be seen; sky is natural)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

****TARGET CHILD'S BEDROOM****

71 Whose room is this?
A=child B=adult C=both

72 How many people inhabit this room ?
A=1 B=2 C=3 D=4

73 Do you have to walk through the bedroom to get to another room? (except for a bathroom)
A = no B = yes, 1 other room C = yes, 2 or more rooms

74 Does the door close ?
A = yes B = not tight C = no

75 Do the windows have blinds / curtains?
A = yes, in good condition
B = yes, in poor condition (broken slats, holes, a make shift blind such as a sheet or ripped, short curtains)
C = none

76 How much clutter is there in the room?
A=little B=some clutter C=chaos

77 How clean is the room?
A=clean
B=satisfactory (e.g., dirt in corners of floor, one item dirty, but rest of bedroom clean)
C=dirty/moldy

78 Is there any exposed structural wiring ?
A=no B=yes

79 Are there extension cords exposed (excluding those around the perimeter of the room) ?
A = no B = yes

80 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

81 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

82 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

83 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

84 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

85 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

86 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

87 What is the view from the room? (stand where most natural view can be seen; sky is OK)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

BEDROOM #2 (parents or tutor)
(skip to item 174, when you run out of bedrooms)

88 Whose room is this?
A=child B=adult C=both

89 How many people inhabit this room ?
A=1 B=2 C=3 D=4

90 Do you have to walk through the bedroom to get to another room? (except for a bathroom)
A = no B = yes, 1 other room C = yes, 2 or more rooms

91 Does the door close ?
A = yes B = not tight C = no

92 Do the windows have blinds / curtains?
A = yes, in good condition
B = yes, in poor condition (broken slats, holes, a make shift blind such as a sheet or ripped, short curtains)
C = none

93 How much clutter is there in the room?
A=little B=some clutter C=chaos

94 How clean is the room?
A=clean
B=satisfactory (e.g., dirt in corners of floor, one item dirty, but rest of bedroom clean)
C=dirty/moldy

95 Is there any exposed structural wiring ?

A=no B=yes

96 Are there extension cords exposed (excluding those around the perimeter of the room) ?
A = no B = yes

97 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

98 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

99 Is there water-related ceiling or wall damage?
A= no B = stained
C = stained and cracked or moldy
D = damp right now

100 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

101 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

102 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

103 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

104 What is the view from the room? (stand where most natural view can be seen; sky is OK)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

BEDROOM #3

105 Whose room is this?
A=child B=adult C=both

106 How many people inhabit this room ?
A=1 B=2 C=3 D=4

107 Do you have to walk through the bedroom to get to another room? (except for bathroom)
A = no B = yes, 1 other room C = yes, 2 or more rooms

108 Does the door close ?
A = yes B = not tight C = no

109 Do the windows have blinds / curtains?
A = yes, in good condition
B = yes, in poor condition (broken slats, holes, a make shift blind such as a sheet or ripped, short curtains)
C = none

110 How much clutter is there in the room?
A=little B=some clutter C=chaos

111 How clean is the room?
A=clean
B=satisfactory (e.g., dirt in corners of floor, one item dirty, but rest of bedroom clean)
C=dirty/moldy

112 Is there any exposed structural wiring ?
A=no B=yes

113 Are there extension cords exposed (excluding those around the perimeter of the room)?
A = no B = yes

114 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

115 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

116 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

117 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

118 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

119 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

120 How many pictures, posters, wall hangings, or calendars are in the room?

A = 4 or more B = 3 C =2 D = 1 E = 0

121 What is the view from the room? (stand where most natural view can be seen; sky is OK)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

BEDROOM #4

122 Whose room is this?
A=child B=adult C=both

123 How many people inhabit this room ?
A=1 B=2 C=3 D=4

124 Do you have to walk through the bedroom to get to another room? (except for bathroom)
A = no B = yes, 1 other room C = yes, 2 or more rooms

125 Does the door close ?
A = yes B = not tight C = no

126 Do the windows have blinds / curtains?
A = yes, in good condition
B = yes, in poor condition (broken slats, holes, a make shift blind such as a sheet or ripped, short curtains)
C = none

127 How much clutter is there in the room?
A=little B=some clutter C=chaos

128 How clean is the room?
A=clean
B=satisfactory (e.g., dirt in corners of floor, one item dirty, but rest of bedroom clean)
C=dirty/moldy

129 Is there any exposed structural wiring ?
A=no B=yes

130 Are there extension cords exposed (excluding those around the perimeter of the room)?
A = no B = yes

131 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

132 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

133 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

134 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

135 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

136 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

137 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

138 What is the view from the room? (stand where most natural view can be seen; sky is 0K)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

BEDROOM #5

139 Whose room is this?
A=child B=adult C=both

140 How many people inhabit this room ?
A=1 B=2 C=3 D=4

141 Do you have to walk through the bedroom to get to another room? (except for bathroom)
A = no B = yes, 1 other room C = yes, 2 or more rooms

142 Does the door close ?
A = yes B = not tight C = no

143 Do the windows have blinds / curtains?
A = yes, in good condition
B = yes, in poor condition (broken slats, holes, a make shift blind such as a sheet or ripped, short curtains)
C = none

144 How much clutter is there in the room?
A=little B=some clutter C=chaos

145 How clean is the room?
A=clean
B=satisfactory (e.g., dirt in corners of floor, one item dirty, but rest of bedroom clean)
C=dirty/moldy

146 Is there any exposed structural wiring ?
A=no B=yes

147 Are there extension cords exposed (excluding those around the perimeter of the room)?
A = no B = yes

148 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

149 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

150 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

151 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

152 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

153 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

154 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

155 What is the view from the room? (stand where most natural view can be seen; sky is OK)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

BEDROOM #6

156 Whose room is this?
A=child B=adult C=both

157 How many people inhabit this room ?
A=1 B=2 C=3 D=4

158 Do you have to walk through the bedroom to get to another room? (except for bathroom)
A = no B = yes, 1 other room C = yes, 2 or more rooms

159 Does the door close ?
A = yes B = not tight C = no

160 Do the windows have blinds / curtains?
A = yes, in good condition
B = yes, in poor condition (broken slats, holes, a make shift blind such as a sheet or ripped, short curtains)
C = none

161 How much clutter is there in the room?
A=little B=some clutter C=chaos

162 How clean is the room?
A=clean
B=satisfactory (e.g., dirt in corners of floor, one item dirty, but rest of bedroom clean)
C=dirty/moldy

163 Is there any exposed structural wiring ?
A=no B=yes

164 Are there extension cords exposed (excluding those around the perimeter of the room)
A = no B = yes

165 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

166 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

167 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

168 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

169 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

170 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

171 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

172 What is the view from the room? (stand where most natural view can be seen; sky is OK)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

FAMILY ROOM

173 What is the condition of the couches and chairs ?
A = upholstery or finish good / sturdy B = ripped, scratched, dirty
C = not sturdy or badly torn D = none

174 How much clutter is there in the room?
A=little b=some clutter c=chaos

175 How clean is the room?
A = clean
B = satisfactory (e.g., dirt in corners of floor one item dirty, but rest of room clean)
C = dirty /moldy

176 Is there any exposed structural wiring ?
A=no B=yes

177 Are there extension cords exposed (excluding those around the perimeter of the room)
A = no B = yes

178 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

179 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

180 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

181 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

182 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

183 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

184 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

185 What is the view from the room? (stand where most natural view can be seen; sky is 0K)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

LIVING ROOM

186 What is the condition of the couches and chairs ?
A = upholstery or finish good / sturdy B = ripped, scratched, dirty
C = not sturdy or badly torn D = none

187 How much clutter is there in the room?
A=little b=some clutter c=chaos

188 How clean is the room?
A = clean
B = satisfactory (e.g., dirt in corners of floor one item dirty, but rest of room clean)
C = dirty /moldy

189 Is there any exposed structural wiring ?
A=no B=yes

190 Are there extension cords exposed (excluding those around the perimeter of the room)
A = no B = yes

191 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

192 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

193 Is there water-related ceiling or wall damage?

A= no B = stained C = stained and cracked or moldy
D = damp right now

194 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

195 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

196.Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

197 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

198 What is the view from the room? (stand where most natural view can be seen; sky is 0K)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

STUDY ** ask if anyone sleeps here at least 4 nights per week **
**if yes rate as a bedroom, if no rate as a study **

199 How much clutter is there in the room?
A=little b=some clutter c=chaos

200 How clean is the room?
A = clean
B = satisfactory (e.g., dirt in corners of floor one item dirty, but rest of room clean)
C = dirty /moldy

COMPUTER SHEET 2

201 Is there any exposed structural wiring ?
A=no B=yes

202 Are there extension cords exposed (excluding those around the perimeter of the room)?
A = no B = yes

203 Are there locks on the windows ?
A = all B = some C = none leave blank if not applicable

204 If there is an exterior door, does it lock ?
A = lock and bolt B = bolt only C = lock only D=no blank if no exterior door

205 Is there water-related ceiling or wall damage?
A= no B = stained C = stained and cracked or moldy
D = damp right now

206 Ceiling or wall: worst protective surface (paint, wallpaper, molding, tiles...)
A=good B = less than 1sq foot loose or missing
C = more than 1sq foot loose or missing

207 Ceiling or wall: structural surface (includes wood, drywall, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

208 Floor surface (includes wood, carpet, tiles, linoleum, etc.)
A = good B = less than 1 sq ft loose or warped C = less than 1 sq ft hole
D = more than 1sq ft loose or warped E = more than 1sq ft hole

209 How many pictures, posters, wall hangings, or calendars are in the room?
A = 4 or more B = 3 C =2 D = 1 E = 0

210 What is the view from the room? (stand where most natural view can be seen; sky is 0K)
A = more than 50% natural B = less than 50% natural
C = no natural or too high to see D = no window

GENERAL HOUSE INSIDE

211 Toys are accessible to child in
A = more than 1 room B = in 1 room only
C = nothing clearly being used as a toy is readily accessible

212 In what condition are the staircases? (not basement stairs)
A= good B = functionally good, but cracked or discolored
C = potentially dangerous (e.g., severe structural damage - No backs to single stairs-nails stick out; stairs move when used)

213 In what condition is the handrail?
A=good B = wobbly but useable C = unuseable D = none

214 How many books do you see in the house? (any books-child or adult)
A=more than 20 B = 10-20 C = less than 10 D = none

NUMBER OF ROOMS

Count the number of rooms of each type in the residence–but where the residence is shared, only include those to which the family has normal access. Each room should only be listed once; do not duplicate. Note: eating areas are only counted as an eating rooms (dining rooms) if they are separate, and not part of another room.

A=0 B =1 C = 2 D=3 E= 4 or more

Kitchen
Eating room
Bathroom
Bedrooms
Living rooms
Family Room
Study
Other rooms (no service rooms in basement)

GENERAL HOUSE OUTSIDE

223 If there are more than 2 stairs in the staircase, in what condition is the handrail?
A=good B = wobbly but useable C = unuseable D = none

224 Is there an outside light ? (leave blank if apartment)
A=more than 1 B = 1 C =none

225 Yard: maintenance
A=well kept b=some clutter/unkempt weeds or grass
C=very junky (car parts, etc.)

226 Is there a place for children to play outdoors where parents can watch from the house?
A=yes and has play equipment B = yes but has no play equipment
C = yes but a public place D = no place within sight

227 Access to the home: separate entrance ?
A=all entrances are private and separate
B= there are both separate and shared entrances
C= only one shared entrance

228 Front wall: protective surface (e.g. Paint or siding. If bricks leave blank)
A=good-no damage B=less than 1 sq ft damaged or missing
C=between 1 and 5 sq feet damaged or missing
D=more than 5 sq feet damaged or missing

229 Front wall: structural surface
A=good-no damage B=less than 1 sq ft damaged or missing
C=between 1 and 5 sq feet damaged or missing
D=more than 5 sq feet damaged or missing

230 Side wall 1: protective surface (e.g. Paint or siding. If bricks leave blank)
A=good-no damage B=less than 1 sq ft damaged or missing
C=between 1 and 5 sq feet damaged or missing
D=more than 5 sq feet damaged or missing

231 Side wall 1: structural surface
A=good-no damage B=less than 1 sq ft damaged or missing
C=between 1 and 5 sq feet damaged or missing
D=more than 5 sq feet damaged or missing

232 Side wall 2: protective surface (e.g. Paint or siding. If bricks leave blank)
A=good-no damage B=less than 1 sq ft damaged or missing
C=between 1 and 5 sq feet damaged or missing
D=more than 5 sq feet damaged or missing

233 Side wall 2: structural surface
A=good-no damage B=less than 1 sq ft damaged or missing
C=between 1 and 5 sq feet damaged or missing
D=more than 5 sq feet damaged or missing

234 Back wall: protective surface (e.g. Paint or siding. If bricks leave blank)
A=good-no damage B =less than 1 sq ft damaged or missing
C=between 1 and 5 sq feet damaged or missing
D=more than 5 sq feet damaged or missing

235 Back wall: structural surface
A = good-no damage B = less than 1 sq ft damaged or missing
C = between 1 and 5 sq feet damaged or missing
D = more than 5 sq feet damaged or missing

236 Is there any evidence of septic tank or sewage leakage?
A=no evidence B = ground sinking C = visible/bad odor

237 What type of house is this?
A = detached, single family B = mobile home
C = duplex (double house) or row house
D = multiple dwelling (more than 1 family shares this residence)

238 How many floors in the building ?
A=1 B=2 C=3 D=4 E=5 or more

239 What floor is the home on (if an apartment or complex)?
A = Ground B = 1 C = 2 D = 3 E =4 or more

NEIGHBOURHOOD

240 What is the distance to the closest neighbor?
A=less 8m B = 8 to 16m C =16 to 30m D =30 to 150m E =more

241 How busy is the street outside of the house ?
A = no cars in time spent at house B = a few cars have gone by
C = heavy /steady traffic

242 Number of lanes (don't count parking)
A=1 B=2 C = 3 D = 4 E = 5 or more

243 In what condition is the sidewalk outside of the home?
A=good B = o.k. (cracked) C = bad D = none

244 Within the block, how many houses have severe structural damage or are badly in need of new paint or siding?
A = none B = few C = most houses look bad E = there are no houses around

245 Is there litter in this block?
A = none B = some C = a lot

Appendix F: *The Parent Interview*

Subject id_____ Rater name_____ Parent gender_____

First name of target child_____

BASEMENT

246 Do you have seasonal water problems?
A= yes B = no

247 If yes, when do you have them?
A = never B = once every 2 or 3 months C = every month

KITCHEN

248 How often does your kitchen sink's drain clog?
A = never B = once in six months C = more than once in six months

249 How well does your oven work?
A = well
B = small problems (e.g., broken temperature gauge, only one coil works, door is broken, timer is broken, knobs tough to turn or broken)
C = doesn't work D = none

250 Does this heat system keep you comfortable?
A=very comfortable B = comfortable C = uncomfortable D= very uncomfortable

251 How well does your refrigerator work?
A=well
B = small problems (e.g., door doesn't close properly, not between 32 and 40 degrees, doesn't keep food cold enough)
C=doesn't work D=none

BATHROOM (first bathroom)

252 Does your bathroom sink drain clog?
A=never B = once in six months C = more than once in six months

253 Does your toilet clog or back up?
A=never B = once in six months C = more than once in six months

254 Does your bathtub or shower drain clog?
A = never B = once in six months C = more than once in six months

255 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

BATHROOM (second bathroom)

256 Does your bathroom sink drain clog?
A=never B = once in six months C = more than once in six months

257 Does your toilet clog or back up?
A=never B = once in six months C = more than once in six months

258 Does your bathtub or shower drain clog?
A = never B = once in six months C = more than once in six months

259 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

BEDROOM (target child's)

260 How many people typically sleep in this bedroom 4 days a week or more
A = 1 B= 2 C = 3 D = 4 E = 5 or more

261 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

BEDROOM #2 (parents or tutor)

262 How many people typically sleep in this bedroom 4 days a week or more
A = 1 B= 2 C = 3 D = 4 E = 5 or more

263 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

BEDROOM #3

264 How many people typically sleep in this bedroom 4 days a week or more
A = 1 B= 2 C = 3 D = 4 E = 5 or more

265 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

BEDROOM #4

266 How many people typically sleep in this bedroom 4 days a week or more
A = 1 B= 2 C = 3 D = 4 E = 5 or more

267 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

BEDROOM #5

268 How many people typically sleep in this bedroom 4 days a week or more
A = 1 B= 2 C = 3 D = 4 E = 5 or more

269 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

BEDROOM #6

270 How many people typically sleep in this bedroom 4 days a week or more
A = 1 B= 2 C = 3 D = 4 E = 5 or more

271 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

LIVING ROOM

272 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

EATING AREA
If house has more than 1 eating area, rate them separately (e.g. kitchen & dining room)

273 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

STUDY

274 Does this heat system keep you comfortable?
A= very comfortable B = comfortable C = uncomfortable D= very uncomfortable

GENERAL HOUSE INSIDE

275 Does more than one family share this house?
A=yes B=no

276 If so how many ? A=2 B=3 C=4 D=5 E=more than 5

277 Do you ever have flooding?
A=never B=once every 3 months C=once a month or more

278 Do you use heat supplements in any room?
A=yes B=no

279 Does the main heat ever breakdown?
A=never B=once every 3 months C=once a month or more

280 How often was it too cold this winter or the one just past?
A=never B=once every 3 months C=once a month D=weekly

281 Does the child have a place where he/she can be alone whenever he/she wants?
A=separate room that does not open to living room, kitchen, or high activity center
B=separate room that does open to living room, kitchen, or high activity center
C=alcove in a room
D=none

282 In your home, people get under foot or in the way. Do you
A=strongly disagree B=disagree C=neither agree nor disagree
D= agree E=strongly agree (with this statement)

283 Do you ever run out of hot water?
A=never B=once every 3 months C=once a month or more
D=no hot water heater

284 How many times in a typical winter month do fuses blow or breakers trip ?
A=never B=1 C=2 D=3 E=4 or more

285 Do the lights dim when appliances are turned on?
A=no appliances cause this to happen
B=some appliances cause this to happen
C=any appliance will cause this to happen

286 How many times did your pipes freeze in the past two winters ?
A=never B=1 C=2 D=3 E=4 or more

287 Your home is crowded. Do you
A=strongly disagree B=disagree C=neither agree nor disagree
D=agree E=strongly agree (with this statement)

288 When everyone is home, I feel crowded.
A=strongly disagree B=disagree C=neither agree nor disagree
D=agree E=strongly agree (with this statement)

289 Does the child have a designated play space other than his/her bedroom?
A=yes, a separate room that is solely for play

B=yes, but it is part of another room
C=no designated play space

290 How often do you have problems with rodents (e.g. Mice and rats)?
A=never B=once every 2 or 3 months C=once a month or more

291 How often do you have problems with ants or spiders ?
A=never B=once every 2 or 3 months C=once a month or more

292 How often do you have problems with roaches ?
A=never B=once every 2 or 3 months C=once a month or more

293 Your home is cramped.
A=strongly disagree B=disagree C=neither agree nor disagree
D=agree E=strongly agree (with this statement)

NEIGHBOURHOOD

294 The closest elementary school is
A=less than 1 mile away B=1-3 miles away C=more than 3 miles away

295 The closest playground is (do not count yard)
A=less than 1 mile away B=1-3 miles away C=more than 3 miles away

296 There is a lot of crime in my neighbourhood
A=strongly disagree B=disagree C=neither agree nor disagree
D=agree E=strongly agree (with this statement)

297 How often are you bothered by noise from the following sources: neighbors , traffic, construction or machinery, airplanes, neighbourhood pets, trains
A=never B=once a month C=once a week D= twice a week
E=every day (answer is total disturbances from all sources)

298 My home is safe from break-ins and vandalism
A=strongly agree B=agree C=neither D=disagree
E=strongly disagree (with this statement)

299 How far is the closest park or open space? (don't count house's own yard)
A=less than one block B=2-9 blocks C=more than one mile

300 When and where do you let this child outside during the day?
A=anywhere B=in the yard C=not allowed out during the day

301 When and where do you let this child out at night?
A=anywhere B=in the yard C=not allowed out at night

302 Where do you feel secure taking a walk in your neighbourhood during the day?

A=anywhere B=in the yard C=nowhere

303 Where do you feel secure taking a walk in your neighbourhood during the night?
A=anywhere B=in the yard C=nowhere

304 Do you lock the doors when you go out?
A=never B=only if gone all day C=even if gone for 1 hour or less

305 How often do you spend time with your neighbors?
A=every day B=twice a week C=once a week D=once a month
E=never

306 How often are you bothered by air pollution?
A=never B=once a month C=once a week D= twice a week E=every day

307 The public transportation in my neighbourhood
A=has good service and has a stop less than 500 feet away
B=has good service, but the stop is more than 500 feet away
C=has bad service, but the stop is less than 500 feet away
D=has bad service, and the stop is more than 500 feet away

308 I feel very close to my neighbors.
A=strongly agree B=agree C=neither D=disagree E=strongly disagree

309 Do you lock your car door when it is parked at home? If no car, leave blank
A=never b=when I'm away C=even when I'm at home

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